EXHIBIT 7

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

OPTIS WIRELESS TECHNOLOGY, LLC, OPTIS CELLULAR TECHNOLOGY, LLC, UNWIRED PLANET, LLC, UNWIRED PLANET INTERNATIONAL LIMITED, AND PANOPTIS PATENT MANAGEMENT, LLC	**Civil Action No. 2:19-cv-66-JRG**
Plaintiffs,	
vs.	**Jury Trial Requested**
APPLE INC.,	
Defendant	

Dr. Mark Mahon's Declaration in Support of Plaintiffs' Claim Construction Positions

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I. Engagement

1. I have been retained by counsel for PanOptis Patent Management LLC and Optis Wireless Technologies, LLC (collectively, "PanOptis") as an expert witness in the above-captioned proceeding.

2. I have been asked to provide an opinion regarding the meaning of various terms found in U.S. Patent Nos. 8,385,284 (the "'284 patent"), Ex. 1; 8,005,154 (the "'154 patent"); and 9,001,774 (the "'774 patent").

II. Background and Qualifications

3. I am an Associate Teaching Professor in the School of Electrical Engineering and Computer Science at Pennsylvania State University, University Park, PA ("Penn State"). I have worked on telecommunications networks, including IS-95, CDMA2000, GSM, EDGE, UMTS, and LTE cellular systems, since 1988.

4. I received my B.S. in Electronics Engineering from the University of Scranton in 1987, M.S. in Electrical Engineering and Ph.D. in Acoustics from Penn State in 1991 and 2001 respectively.

5. In 1988, after I received my Bachelor of Science degree in Electronics Engineering, I joined the Central Intelligence Agency (CIA) while pursuing my M.S. degree at PSU part-time. My first job at the CIA involved designing and testing systems to automatically capture and characterize telecommunication signals and emissions from various computer networking devices.

6. I returned to PSU in early 1990 to pursue graduate research full-time and to complete my M.S. degree. My graduate research work focused on wideband beamforming and adaptive signal processing. After completing my M.S. degree in EE in 1991, I accepted

a full-time faculty research position at the Applied Research Lab at PSU, primarily working on classified programs, and began working on diverse radio frequency and acoustic sensor systems including wireless communications and small wireless networks for acoustic tracking, source localization, and feature extraction.

7. I began pursuing my Ph.D. part-time in 1993 while continuing my faculty research position. In 1998, as part of my faculty research position, I began working on classified programs focused on mathematical analytical modeling of cellular communication networks and the development of hardware and software systems to test against cellular networks. My role was to develop the algorithms and write the code running on a specially developed embedded system. For this work, I received a letter of recognition as the "genius behind the VELA software algorithms" from the Director of National Reconnaissance Office (NRO) Systems Engineering and Technology Office. In 2000, my research extended into utilizing non-orthogonal wavelets for improving detection and localization of cellular handsets from high altitude sensor systems including IS-95 and CDMA2000 protocols.

8. In 2001, I completed my Ph.D. and my research focused on the utilization of advanced communication signals for wideband characterization and remote sensing of propagation channels.

9. Beginning in 2003 my cellular communications research work focused on GSM, EDGE, UMTS, and LTE cellular systems under grants sponsored primarily by the Department of Defense. This classified research work required 3GPP protocol analysis and development of real-time embedded hardware and software systems capable of interacting with cellular networks and cellular handsets. A large portion of my work was directed at architectures, protocols, software, and signaling.

10. I have been working on classified projects since 1988. Before 1999, because the work was not deemed highly classified, I was able to publish eight journal and conference papers prior to 2000. *See* Appendix A.

11. Between 1999 and 2015, however, I was allowed to publish only one article in an unclassified symposium and published and presented about a dozen articles in classified settings. This is because during this period, the vast majority of my research was highly classified. As a result, nearly all of my research results were summarized in classified reports and not available to the general public. Further, because the US government owns any intellectual property resulting from the sponsored research work, I did not pursue or file patent applications.

12. In 2015, I transferred to the School of Electrical Engineering and Computer Science at Penn State as a teaching faculty member. In that role, I have continued teaching graduate and undergraduate courses, guiding Ph.D. and M.S. students in communication and mobile networking (including LTE and 5G cellular networks), and pursuing research in this and related areas. Since 2015, I have been an author on two refereed papers as listed in my curriculum vitae (CV).

13. Because of my decades of research and my continuing work at Penn State, I have intimate knowledge of telecommunication networks, including the technology involved in the '284, '154, and '774 patents. I have been highly recognized as an expert in such systems within the research community. I was recognized twice by the National Reconnaissance Office with commendation letters (one is quoted above) for work dealing with detecting cellular signals in low signal to noise ratio environments. The U.S. government awarded me over $12M between 2003 and 2015 for projects focused on mobile

communication devices and networks, in which I served as a Principal Investigator (PI), Co-PI, and/or technical lead.

14. During my research career, I interacted extensively with computer scientists and engineers responsible for the design, development, and testing of telephony and data networking systems and testbeds. As a research faculty member, I oversaw engineers and computer scientists that executed many joint projects with development organizations. These interactions exposed me to a wide range of computer scientists and engineers working on telecommunication network technologies. Since 2011, I have been teaching undergraduate and graduate classes in communication and mobile networking and am familiar with the curricula being taught to electrical engineers and computer scientists. The interactions with a wide range of computer scientists and engineers working on telecommunication network technologies and the familiarity with the classes taught to electrical engineers and computer scientists have allowed me to have a good understanding of the level of skills possessed by a person of ordinary skill as defined in Section VII.

15. My CV is included as Appendix A to this declaration.

III. Materials Reviewed

16. Appendix B to this declaration includes a list of materials that I have reviewed for this declaration. In addition to intrinsic evidence such as the patents, the priority documents (PCT/EP2008/010845; provisional applications 60/673,574, 60/673,674, and 60/679,026; and the translation of KR 10-2006-0133210), U.S. Patent Application No. 11/327,799 (incorporated by reference in the '774 specification) and the prosecution histories, I also reviewed the following extrinsic evidence:

- PanOptis' and Huawei's expert declaration and briefings as related to the claim construction of the '284 patent's disputed terms in *Optis Wireless Technology, LLC, et al. v. Huawei Device USA, Inc., et al.*, C.A. No. 17-CV-123, (E.D. Tex.);
- the Court's memorandum and order on claim construction as related to the '284 patent in *Optis Wireless Technology, LLC, et al. v. Huawei Device USA, Inc., et al.*, C.A. No. 17-CV-123, Dkt. 114 (E.D. Tex. Jan. 18, 2018) [Appendix C];[1]
- Dr. Womack's infringement report as related to the '284 patent in *Optis Wireless Technology, LLC, et al. v. Huawei Device USA, Inc., et al.*, C.A. No. 17-CV-123, (E.D. Tex. March 26, 2018);
- Dr. Womack's rebuttal validity report as related to the '284 patent in *Optis Wireless Technology, LLC, et al. v. Huawei Device USA, Inc., et al.*, C.A. No. 17-CV-123, (E.D. Tex. April 23, 2018);
- Dr. Womack's trial testimony as related to the '284 patent in *Optis Wireless Technology, LLC, et al. v. Huawei Device USA, Inc., et al.*, C.A. No. 17-CV-123, (E.D. Tex. August 21, 2018);
- Rahbar, "Quality of Service in Optical Packet Switched Networks";
- Microsoft Computer Dictionary, Fifth Edition (2002).

IV. The '284 Patent

17. The '284 patent, entitled "Control Channel Signaling using a Common Signaling Field for Transport Format and Redundancy Version," claims priority to

[1] I have reviewed the "Legal Principles" section of Appendix C and have used that understanding of the law for the purposes of this declaration.

PCT/EP2008/010845 filed on December 18, 2008. It names as inventors Christian Wengerter, Akihiko Nishio, Hidetoshi Suzuki, Joachim Loehr and Katsuhiko Hiramatsu, and was originally assigned to Panasonic Corporation.

18. I have reviewed Dr. Womack's infringement report in *Optis Wireless Technology, LLC, et al. v. Huawei Device USA, Inc., et al.*, C.A. No. 17-CV-123, (E.D. Tex. March 26, 2018). I agree with his description of the background technology in paragraphs 251 to 258 of the report, and adopt these descriptions herein as if they were my own.

19. I understand that claims 1-5, 8, 10-12, 14-18, 21, 23-25 and 27-29 of the '284 patent are currently at issue in this litigation. Of these, claims 1 and 14 are independent claims.

20. The '284 specification generally "relates to a method of providing control signalling associated [with] a protocol data unit conveying user data in a mobile communication system and to the control channel signal itself." Ex. 1, Abstract, 1:8-11. The specification also describes the operation of a mobile station or a base station "in view of the newly defined control channel signals" described in the specification. Ex. 1, Abstract, 1:11-15. "One object of the ['284] invention is to reduce the amount of bits required for control channel signaling, such as for example L1/L2 control signaling, in uplink or downlink." *Id.*, 6:57-61. In other words, the '284 patent teaches reducing control channel signaling overhead in the downlink.

21. This objective is achieved with "a new format for the control channel information," whereby "[i] the transport format/transport block size/payload size/modulation and coding scheme and [ii] the redundancy version/constellation version for the associated transmission of the user data . . . is provided in a single field" referred to as "the control

channel information." *Id.*, 6:65-7:5. The patent refers to the single field as "the control information field" or abbreviated as "a TF/RV field." *Id.*, 7:5-8. An example of such a field is the jointly encoded TF/RV field shown in Figure 5 of the specification and reproduced below:

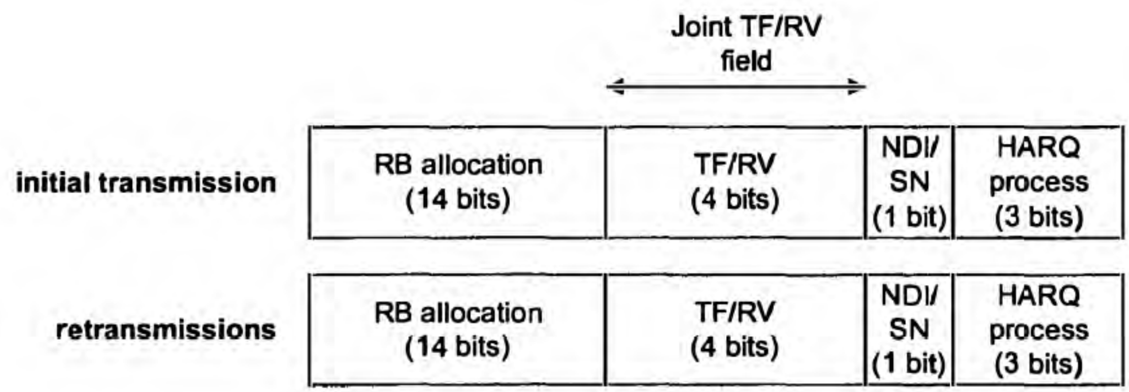


Fig. 5

22. The '284 patent states that the object of the invention—reducing the amount of bits needed for control channel signaling—"is solved by the subject matter of the independent claims." 6:62-64. One independent claim of the '284 patent is claim 1, reproduced below:

> 1[pre]. A mobile terminal for use in a mobile communication system, the mobile terminal comprising:
>
> 1[a] a receiver unit for receiving a sub-frame of physical radio resources comprising a control channel signal destined to the mobile terminal,
>
> 1[b] a processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and
>
> 1[c] a transmitter unit for transmitting the protocol data unit on at least one physical radio resource using the transport format and the redundancy version of the protocol data unit indicated in the received control channel signal,

> 1[d] wherein the control channel signal received within said sub-frame comprises a control information field, in which the transport format and the redundancy version of the protocol data unit are jointly encoded,
>
> 1[e1] wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, [1e2] wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data, and
>
> 1[f] wherein the first subset of the values contains more values than the second subset of the values.

A. Overview of Background Technology

23. I discuss below pertinent background technology, including terminology, as related to the '284 inventions.

24. The '284 patent involves a packet-based mobile communication system. In other words, the mobile communication system referenced in the preamble of claim 1 involves exchange of data packets between a base station and one or more mobile terminals (users). To schedule the transmission of the packets, "at least part of the air-interface resources are assigned dynamically to different users." Ex. 1, 1:20-23. The "dynamically allocated resources are typically mapped to at least one Physical Uplink or Downlink Shared Channel (PUSCH or PDSCH)." *Id.*, 1:23-25. The dynamic scheduling allows for "multi-user diversity gain by time domain scheduling (TDS) and dynamic user rate adaptation." *Id.*, 1:60-62. For example, "at a given time instant the scheduler can assign . . . subcarriers/subbands in case of OFDMA . . .to users having good channel conditions in time domain scheduling." *Id.*, 1:63-67.

25. As noted in the '284 patent, "[i]n order to exploit multi-user diversity and to achieve scheduling gain in frequency domain, the data for a given user [mobile terminal]

should be allocated on resource blocks on which the users have a good channel condition." *Id.*, 2:36-39.

26. To achieve this, "L1/L2 control signaling" over Physical Downlink Control Channel (PDCCH) "needs to be transmitted." *Id.*, 3:9-12. L1/L2 control signaling refers to control signaling exchanged between Layers 1 and 2. L1, or Layer 1, refers to the Physical Layer. The Physical Layer is the layer over which digital bits are physically transmitted, and comprises the radio component of a wireless communication system. The Physical Layer sends and receives data to the Medium Access Control (MAC) layer. The MAC layer is part of L2, or Layer 2, of a wireless network.

27. L1/L2 control signaling can be provided on the downlink to a mobile device to inform the mobile device of the parameters for the uplink transmission. Traditionally, L1/L2 signaling contained information on the time and frequency resources allocated to the UE for transmission of data. *Id.*, 6:1-5, Table 2. The '284 patent introduced a jointly encoded single field comprising transport format and redundancy version as part of the L1/L2 control signaling for the uplink transmission. *Id.*, 6:65-7:8, 7:15-26. The '284 patent contemplates transmitting this inventive L1/L2 control information/channel signal on the PDCCH of a 3GPP LTE system. *Id.*, 15:3-7.

28. A mobile device for use in such a packet-based mobile communication system includes "a receiver unit for receiving a sub-frame of physical radio resources comprising a control channel signal destined to the mobile terminal." "A sub-frame (also referred to as a time slot) reflects the smallest interval at which the scheduler . . . performs the dynamic resource allocation (DRA)." Ex. 1, 1:40-44. For example, in Figure 1, each transmission time interval or TTI in an OFDMA system is assumed to be one sub-frame in

time domain, although "generally a TTI may also span over multiple sub-frames." *Id.*, 1:44-46. In an OFDMA system, the smallest unit of radio resources, or a "resource block," "is typically defined by one sub-frame in time domain and by one subcarrier/subband in the frequency domain." *Id.*, 1:47-51.

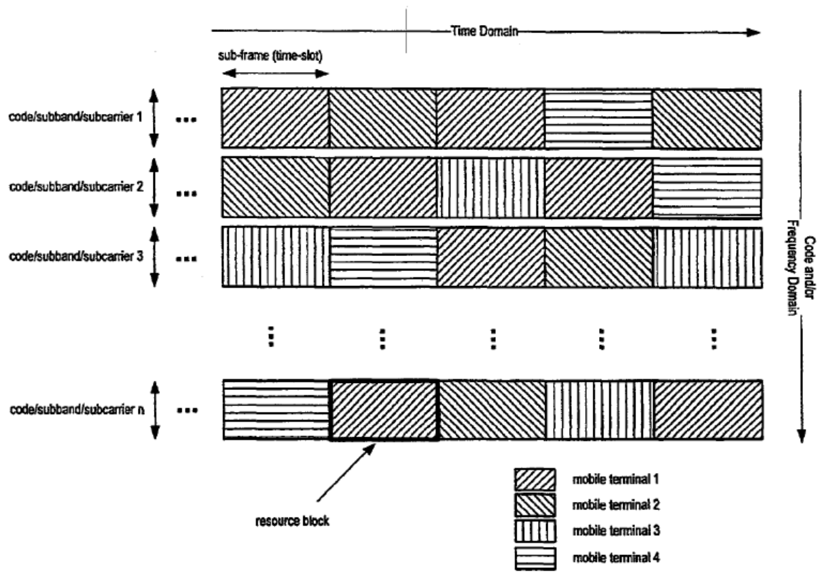


Fig. 1

29. A sub-frame in an OFDMA system can include both control signaling and user data, as showing in Figures 2 and 3.

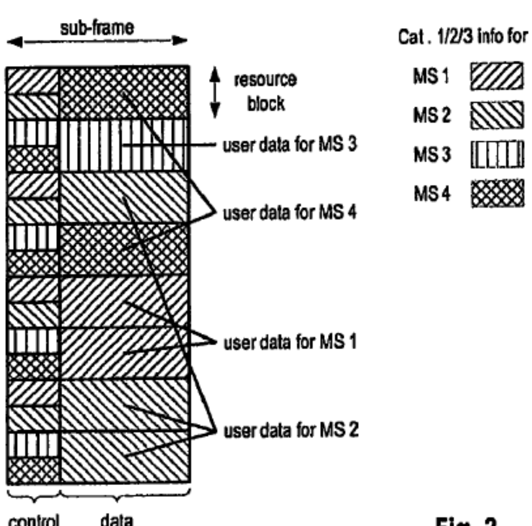


Fig. 2

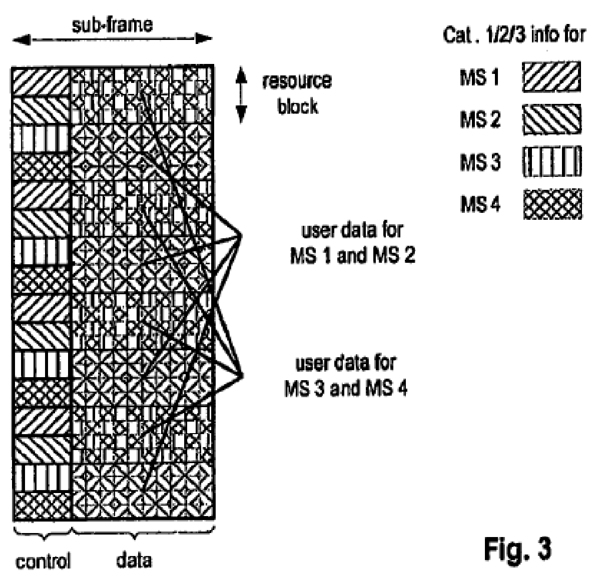


Fig. 3

30. Because control signals and user data are transmitted over shared sub-frames, reducing the amount of bits for the control signals increases the amount of bits available for transmitting user data.

31. The mobile device of the invention also includes "a processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data." In the context of the '284 patent, "the term 'transport format' means either one of 'transport format,' 'transport block size,' 'payload size' or 'modulation and coding scheme'." *Id.*, 15:10-15. Similarly, in the context of the '284 patent, "redundancy version" may be "replaced by 'redundancy version and/or constellation version." *Id.*, 15:13-15. In the '284 patent, a redundancy version "denotes a set of encoded bits generated [for] a given transport block" and "is required for de-rate-matching." *Id.*, 14:27-42, 4:17-21. In contrast, a constellation version "denotes the constellation diagram being applied for the modulation of the data transmission" such as "a specific bit-to-symbol mapping for a given modulation scheme" or "a specific bit operations by interleaving and/or inversion of bit values in order to achieve a similar effect as by applying a specific bit-to-symbol mapping." *Id.*, 14:43-52. Constellation version is "required for demodulation." *Id.*, 4:17-21.

32. While prior art systems' L1/L2 control signaling, such as HSDPA's L1/L2 signaling, also included transport format (TF, 6 bits) and redundancy version (RV, 2 bits), those bits were all explicitly signaled as separate bits. *Id.*, 6:44-53. The '284 patent, however, introduced the concept of jointly encoding the TF and RV information as a single field in order to increase the throughput for user data transmission. This innovative concept is reflected in, for example, the three wherein clauses of claim 1.

33. The mobile device of the invention further includes "a transmitter unit for transmitting the protocol data unit on at least one physical radio resource using the transport format and the redundancy version of the protocol data unit indicated in the received control channel signal." As explained by the '284 specification, an L1/L2 control signal may be "provided on the downlink to the transmitters in order to inform them on the parameters for the uplink transmission." *Id.*, 5:2-4. Such an L1/L2 control signaling "typically indicates the physical resource(s) on which the UE should transmit the data (*e.g.*, subcarriers or subcarrier blocks in case of OFDM) . . . and a transport format the mobile station should use for uplink transmission." *Id.*, 5:27-31. Similarly, the L1/L2 control signaling of the '284 invention "is associated to protocol data unit transporting user data and comprises a control information field consisting of a number of bits jointly encoding a transport format and a redundancy version used for transmitting the protocol data unit." *Id.*, 7:15-22. As noted in the '284 patent's Technical Background section, the protocol user data is transmitted over resource blocks. *See* Figs. 2 and 3.

34. I explain below the '284 patent's inventive jointly encoded TF/RV control information field and its various implementations, as reflected, for example, in the three "wherein" clauses of claim 1.

B. Overview of The '284 Patent's Jointly Encoded TF/RV Field

35. In contrast to the 3GPP HSDPA system where TF and RV are separately signaled, the '284 patent manages "to reduce the amount of bits required for control channel signaling" without increasing HARQ protocol error rate (*e.g.*, miscommunication of the redundancy version). *Id.*, 6:57-61. This is achieved in part by including in the control channel signal a common "control information field" denoted as "TF/RV" field that

"consists of a number of bits jointly encoding a transport format and a redundancy version used for transmitting the protocol data unit."[2] *Id.*, 6:65-7:8, 7:18-26. This aspect of the invention is reflected in the claim limitation "wherein the control channel signal received within said sub-frame comprises a control information field, in which the transport format and the redundancy version of the protocol data unit are jointly encoded."

36. As the '284 patent explains, "[w]hen using joint encoding, there is one common field for the transport format and the redundancy version defined in the control channel information/signal." *Id.*, 15:29-31. This is illustrated by Figure 5's 4-bit "Joint TF/RV field." In this illustration, "the transport format and redundancy version are jointly encoded in a common field ("Joint TF/RV field") irrespective of whether the control channel information relates to an initial transmission or a retransmission. The four bits of the common field for transport format and redundancy version may for example represent the transport format and redundancy versions." *Id.*, 22:52-58.

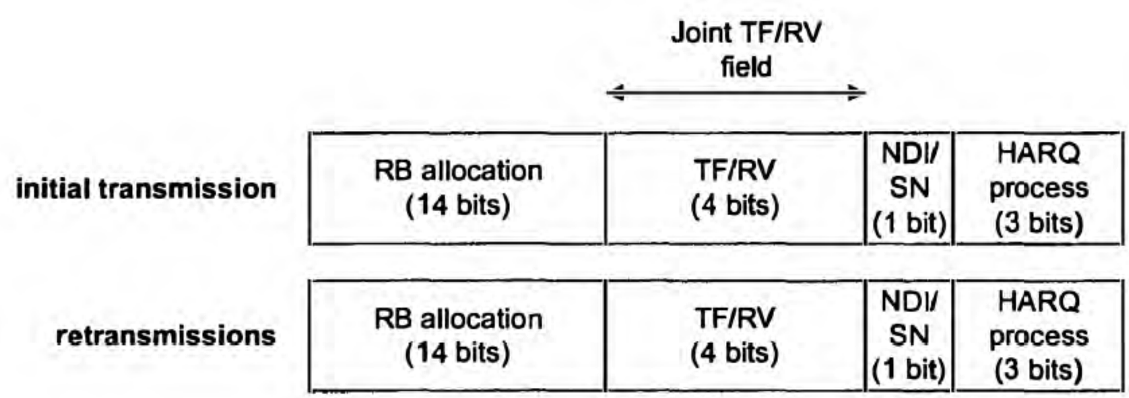


Fig. 5

[2] In the '284 patent, the received control channel signal is "associated to [sic] the protocol data unit transporting user data." Ex. 1, 7:18-19.

37. The joint-encoding approach differs from the alternative "shared signaling of transport format and redundancy version" approach, shown in Figure 6. *Id.*, 15:21-25, 22:42-23:6. In the alternative shared signaling or shared field approach, the field represents different parameters for initial transmission and retransmission. *Id.*

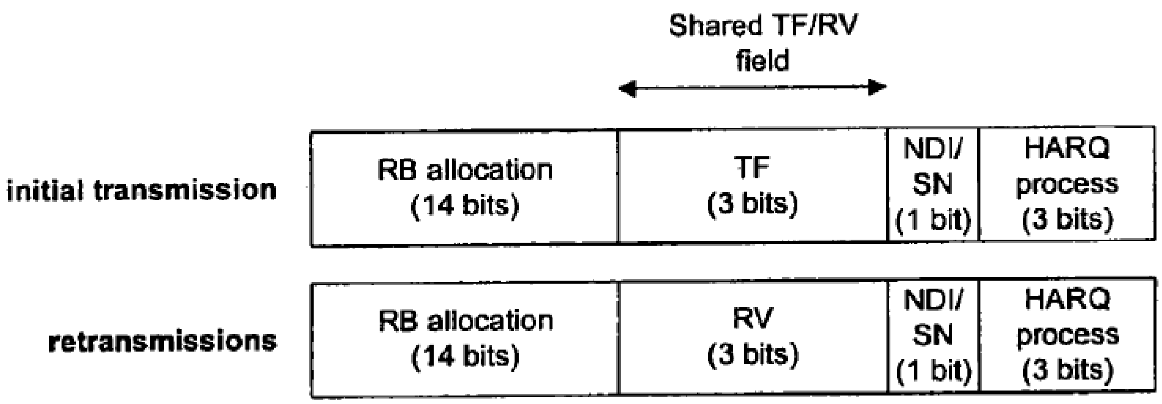


Fig. 6

38. In one joint-encoding embodiment, the control information field "consists of a number of bits yielding a range of values that can be represented in the control information field." *Id.*, 7:36-39. For example, "if there are N bits provided in the field, 2^N different values may be represented in the field." *Id.*, 7:39-40. These 2^N different values may be divided into *e.g.*, two subsets, with a first subset "reserved for indicating a transport format of the protocol data unit and a second subset of values . . . reserved for indicating a redundancy version for transmitting the user data." *Id.*, 7:41-44; *see also* 8:40-54, 15:29-41, 16:46-59. By identifying the number of bits corresponding to the control information field, the control information field—which consists of the jointly encoded "transport format and the redundancy version for the protocol data packet conveying user data"—can be determined "based on the received control channel signal." *Id.*, 10:25-31.

39. The '284 patent provides several examples, including Tables 3-8, illustrating the composition of the 4-bit control information field. For example, Table 3 consists of 16 entries for the 4-bit TF/RV field, corresponding to 2^4 values of TF/RV field. The first 13 entries (as outlined in the red box) in the "TF range" "is used to indicate different transport formats that are associated to a given redundancy version (RV 0)." *Id.*, 16:61-64. The last 3 entries (outlined in the blue box) in the "RV range" "indicate[s] a redundancy version of the respective transmission." *Id.* 16:64-67. In this example, there are more values in the first subset of values (TF range) than the second subset of values (RV range).

TABLE 3

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	0	
0101	5	100	0	
0110	6	120	0	
0111	7	150	0	
1000	8	200	0	
1001	9	—	0	
1010	10	—	0	
1011	11	—	0	
1100	12	—	0	
1101	13	N/A	1	RV range
1110	14		2	
1111	15		3	

40. This aspect of the invention is reflected by the limitation "wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for

transmitting the user data" and "wherein the first subset of the values contains more values than the second subset of the values."

V. The '154 Patent

41. I have been asked to provide opinions regarding the meaning of certain claim terms in the '154 patent. The '154 patent is titled "Method and apparatus for transmitting and receiving shared control channel message in a wireless communication system using orthogonal frequency division multiple access."

42. I understand that Plaintiffs have asserted claims 33, 34, 37, and 38, and assert a priority date of December 22, 2006 for the '154 Patent. I have been asked to assume this priority date for this patent and have therefore analyzed the claim constructions and knowledge of one of ordinary skill as of that date.

43. Cellular communication systems such as Long Term Evolution (LTE) networks are made up of "cells" in which end users receive communication service. Each cell is operated by a base station. Wireless standards provide specific formats in which base stations communicate with mobile stations (such as cellular phones). In LTE, base stations send downlink data to mobile stations using Orthogonal Frequency Division Multiple Access (OFDMA).

44. Some cellular networks, such as LTE networks, support multi-antenna technologies such as multiple-input, multiple-output (MIMO). The use of MIMO can increase overall speeds by transmitting two or more different data streams on two or more different antennas, using the same resources in both frequency and time, separated only through the use of different reference signals. The two or more separate data streams are

then received by two or more separate antennas. One type of MIMO is open-loop spatial multiplexing.

45. Spatial multiplexing can be used when the signal to noise ratio is high—that is, when channel conditions are good. When channel conditions are poor and the signal to noise ratio is lower, a possible alternative is to use other types of multi-antenna techniques such as transmit diversity.

46. The specification of the '154 patent describes a method and apparatus for transmitting/receiving a shared control channel message in an OFDMA system. '154 Patent at 1:15-24. The patent explains that these systems commonly support various antenna technologies using multiple transmit antennas, and that these technologies include Single Input Single Output (SISO) technology, Single Input Multi Output (SIMO) technology, Transmit Diversity technology, and a Multi Input Multi Output (MIMO) technology. '154 Patent at 1:29-35. One type of MIMO technology is open-loop spatial multiplexing.

47. However, as the patent explains, the use of these multiple technologies poses a problem: when the transmitter chooses not to use MIMO technology, but instead transmits using another technology such as Transmit Diversity, the receiver cannot detect the use of the other technology. '154 Patent at 6:1-12. To address this problem, the patent discloses techniques for a base station to indicate which of these transmission schemes, such as transmit diversity or spatial multiplexing, is going to be used in a downlink transmission. *See, e.g.,* '154 Patent at 10:4-37. The patent also teaches techniques for a mobile station to use this transmission information to demodulate the downlink transmission according to the appropriate transmission scheme. *See, e.g.,* '154 Patent at 11:30-36, 12:64-67; cl. 33, 34, 37, 38.

VI. The '774 Patent

48. I have been asked to provide opinions regarding the meaning of certain claim terms in the '774 patent. The '774 patent is titled "System and method for channel estimation in a delay diversity wireless communication system."

49. I understand that Plaintiffs have asserted claims 6-10 and assert a priority date of April 21, 2005 for the '774 Patent. I have been asked to assume this priority date for this patent and have therefore analyzed the claim constructions and knowledge of one of ordinary skill as of that date.

50. Similar to the '154 Patent discussed above, the '774 Patent relates to multi-antenna communication in an OFDMA wireless communication system. Figure 5 shows how a representative embodiment works:

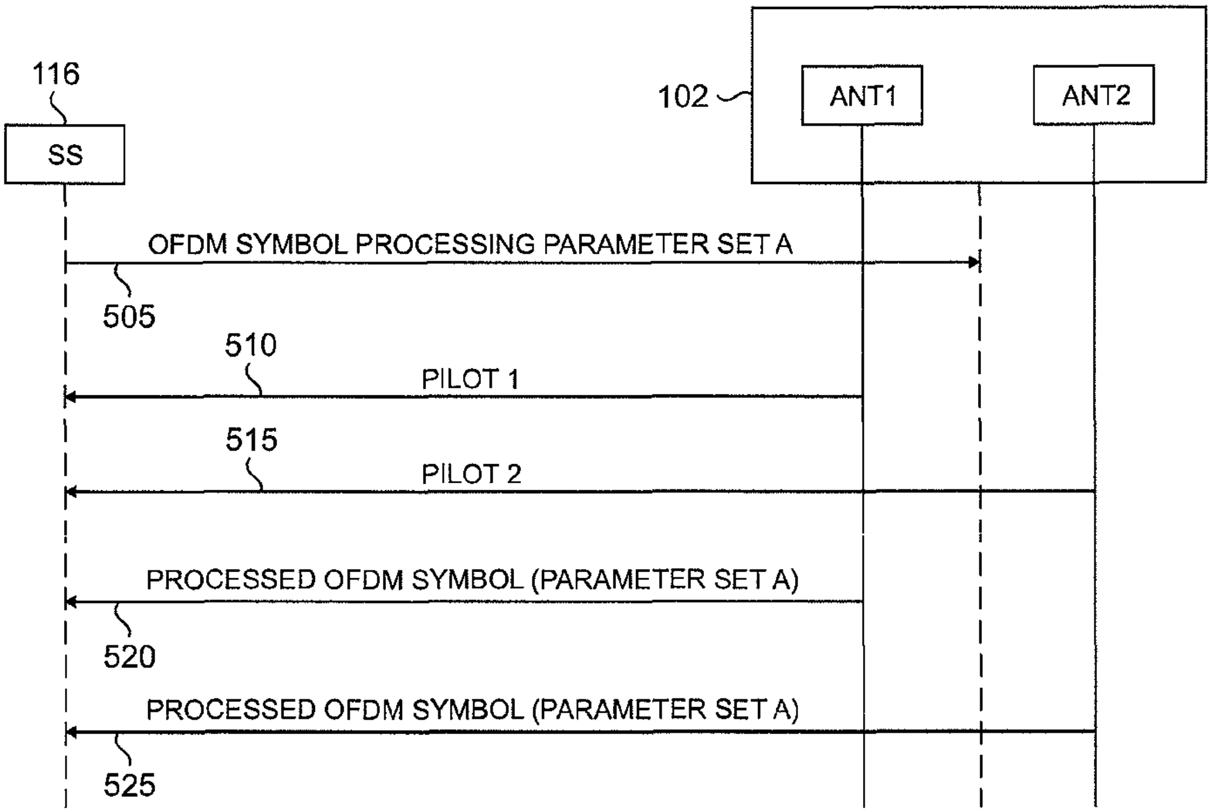


FIG. 5

51. The specification of the '774 patent discusses techniques for selecting symbol processing parameters, such as delay and gain values, to be applied to OFDM symbols. In the embodiment of Figure 5, the '774 patent discloses a system where a subscriber station determines the best processing parameters to use, and then sends that information to the base station (step 505, at the top of the diagram). The base station then uses that information to process the OFDM symbols for transmission to the subscriber station (shown in steps 520 and 525). The subscriber station then receives and demodulates the OFDM symbols. By using this feedback from the subscriber station to process the OFDM signals in a better way, performance of the system is improved.

VII. Level of Skill

52. I understand that terms in a patent are construed as would have been understood by a person of ordinary skill in the art (a "POSITA") at the time of the invention. It is my opinion that for the '284, '154, and '774 patents, such a POSITA is one having an undergraduate degree in Electrical Engineering, Computer Science, or Computer Engineering, or a related field, and around two years of experience in the design, development, and/or testing of cellular networks, and equivalents thereof.

VIII. U.S. Pat. No. 8,385,284

53. I provide below my opinions on the proper constructions of the terms in dispute for the '284 patent.[3]

A. "reserved for indicating" (claims 1, 14)

Term	Plaintiffs' Position	Apple's Position
"reserved for indicating"	No construction necessary. If, however, further parsing is needed for the term, "reserved for" should be understood as "kept, but not exclusively, for the purpose of," and "indicating" should be understood in the context of the '284 patent as "signaling" or "identifying" explicitly or implicitly.	"explicitly signaled"

54. I understand that in *Optis Wireless Tech., LLC v. Huawei Device Co.*, No. 2:17-CV-123-JRG-RSP, 2018 WL 476054, ECF No. 114 (E.D. Tex. Jan. 18, 2018), the Court has construed the term "wherein a first subset of the values is reserved for indicating

[3] I understand that the parties have agreed that the term "transport format" should be interpreted as "transport format, transport block size, payload size, or modulation and coding scheme" as adopted by the Court in *Optis Wireless Tech., LLC v. Huawei Device Co., No.* 2:17-CV-123-JRG-RSP,2018 WL 476054, ECF No. 114 (E.D. Tex. Jan. 18, 2018).

the transport format of the protocol data unit and a second subset of the values, different from the first subset of values, is reserved for indicating the redundancy version for transmitting the user data" "to have its plain and ordinary meaning." *Id.* at 59. Hence, PanOptis's interpretation of the term "reserved for" by its plain and ordinary meaning is consistent with the court's prior construction.

55. Further, the Court has ruled that the '284 specification as a whole makes "clear that 'reserved for' does not have to be reserved for exclusive use." *Id.* at 58. Specifically, the Court observed (*id.*):

> In the context of joint encoding embodiments of the specification, it is clear that some subset of values is reserved for the transport format and some subset of values is reserved for the redundancy version. That the values are reserved, however, does not mean that the values are reserved "exclusively for" so that nothing else can be found there, nor does it mean that there cannot be overlap of the subsets, as shown in the joint encoding embodiments. *See* '284 Patent 16:60-21:3.

56. PanOptis's further clarification that "reserved for" means "kept, but not exclusively, for the purpose of" [signaling/identifying a parameter explicitly or implicitly] is therefore consistent with the Court's prior finding as well as the specification's teachings and the plain and ordinary meaning for the word "reserved."

57. For example, one example of the joint encoding embodiments as shown in Table 3 of the '284 patent includes a first subset of 13 values that "indicate different transport formats that are associated to [sic] a given redundancy version (RV 0)," and a second subset of 3 values that "indicate a redundancy version of the respective transmission." Ex. 1, 16:60-67. The first subset of the values in the TF range indicate both the transport format and the redundancy version (0). Hence, in this example, "reserved for indicating the transport format of the protocol data unit" does not mean the values are kept

exclusively for the purpose of signaling the transport format.

TABLE 3

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	0	
0101	5	100	0	
0110	6	120	0	
0111	7	150	0	
1000	8	200	0	
1001	9	—	0	
1010	10	—	0	
1011	11	—	0	
1100	12	—	0	
1101	13	N/A	1	RV range
1110	14		2	
1111	15		3	

58. Similarly, the implementation corresponding to Table 4 includes a first subset of values (TF range) that signal both transport format and redundancy versions and a second subset of values (RV range) that indicates different redundancy versions associated with retransmission. *See* Table 4, 17:46-64. Specifically, the entries in the TF range of Table 4 each "identify a transport format of the protocol data unit" and a "redundancy version" for initial transmission. *Id.*, 17:54-59. In contrast, the three entries in the RV range "indicat[e] a specific redundancy version" under the assumption that "the transport format is constant or known for all transmissions of a respective protocol data unit." *Id.*, 17:59-64. In this example, the first subset of values (TF range) can explicitly signal both different transport block sizes and redundancy version, based on the signaled value. *Id.*, 17:46-59. For example, a signaled value of "0000" identifies a "small transport block size[]" or a "low MCS level[]" with a corresponding redundancy version of RV 0. *Id.*, Table 4, 17:46-51. As

another example, a signaled value of "0101" identifies a TBS of 100 (a larger transport size) and an RV of 1. *Id.*

TABLE 4

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	1	
0101	5	100	1	
0110	6	120	1	
0111	7	150	1	
1000	8	200	2	
1001	9	—	2	
1010	10	—	2	
1011	11	—	2	
1100	12	—	2	
1101	13	N/A	0	RV range
1110	14		1	
1111	15		2	

59. In a further variant, an entry corresponding to "Out of Range" transport block size is included in the range of values that can be signaled. *Id.*, 18:41-55, Table 5. In this implementation, "the interpretation of the transport format (TBS) value in the common TF/RV field depends on the resource allocation field . . . ." *Id.*, 18:41-44. Given the constraint on the resource block size, "only a specific range of transport block sizes may be signaled." *Id.*, 18:44-49. Thus, if the resource allocation size changes between initial transmission and retransmission, it may not be "possible to signal the correct transport block size," and the out-of-range TF value is helpful under the circumstance. *Id.*, 18:49-55. Nevertheless, as in Table 3, the first subset of values in Table 5 identifies both a transport format and implicitly RV0.

TABLE 5

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	0	
0101	5	100	0	
0110	6	120	0	
0111	7	150	0	
1000	8	200	0	
1001	9	—	0	
1010	10	—	0	
1011	11	—	0	
1100	12	"Out of Range"	0	
1101	13	NA	1	RV range
1110	14		2	
1111	15		3	

60. The fourth example for the joint encoding embodiment is similar, in which the first set of values identifies different transport formats associated with RV0, and the second set of values identifies three different redundancy versions, including RV0 (corresponding to the signaled value "1101"). *Id.*, 19:16-43.

TABLE 6

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	0	
0101	5	100	0	
0110	6	120	0	
0111	7	150	0	
1000	8	200	0	
1001	9	—	0	
1010	10	—	0	
1011	11	—	0	
1100	12	—	0	
1101	13	NA	0	RV range
1110	14		1	
1111	15		2	

61. In further variants, the jointly encoded common field encodes three pieces of control information: a sequence number indicating a new protocol data unit or a new data indicator indicating initial transmission of a new data or retransmission of data. *Id.*, 19:45-50, 19:62-67. Tables 7 and 8 of the '284 patent show two implementations of jointly encoding the new data indicator with the transport format and redundancy version, where Table 7 is similar to Table 6 with RV range including a value corresponding to RV0 and Table 8 is similar to Table 3 where RV range does not include a value corresponding to RV0. *Id.*, 20:51-54. Thus, in Table 8, "the use of redundancy version RV0 may be considered to implicitly also indicate new data" and "all other redundancy versions RVs (RV1-3) indicate retransmissions." *Id.* 20:4-9. Regardless, in both examples, the first subset of values, for example, indicate not only different transport formats, but also associated redundancy value and new data indicator.

TABLE 7

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	NDI	Ranges
0000	0	—	0	1	TF range
0001	1	—	0	1	(new data range)
0010	2	—	0	1	
0011	3	—	0	1	
0100	4	—	0	1	
0101	5	100	0	1	
0110	6	120	0	1	
0111	7	150	0	1	
1000	8	200	0	1	
1001	9	—	0	1	
1010	10	—	0	1	
1011	11	—	0	1	
1100	12	—	0	1	
1101	13	N/A	0	0	RV range
1110	14		1	0	(retransmission
1111	15		2	0	range)

TABLE 8

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	NDI	Ranges
0000	0	—	0	1	TF range
0001	1	—	0	1	(new data range)
0010	2	—	0	1	
0011	3	—	0	1	
0100	4	—	0	1	
0101	5	100	0	1	
0110	6	120	0	1	
0111	7	150	0	1	
1000	8	200	0	1	
1001	9	—	0	1	
1010	10	—	0	1	
1011	11	—	0	1	
1100	12	—	0	1	
1101	13	N/A	1	0	RV range
1110	14		2	0	(retransmission
1111	15		3	0	range)

62. In each of the examples above, the first subset of values is kept for identifying/signaling at least the transport format and the second subset of values is kept for identifying/signaling at least the redundancy version.

63. In this litigation, Apple does not follow the Court's prior construction and argues that the term "reserved for indicating" should be construed as "explicitly signaled." This proposed construction has several issues. First, Apple's construction does not make any sense when substituted back into the claim language: "[is] reserved for indicating the transport format" would now become "explicitly signaled the transport format" and "[is] reserved for indicating the redundancy version for transmitting the user data" would now become "explicitly signaled the redundancy version for transmitting the user data." Neither makes much sense.

64. Second, to the extent that Apple intends the construction to mean the first subset of values has to "explicitly" signal the transport format and the second subset of values has to "explicitly" signal the redundancy version for transmitting the user data, such an interpretation is inconsistent with the teachings of the '284 patent. For example, the summary of the invention provides that:

> In another embodiment, it may be assumed that the transmission of the before-mentioned protocol data unit is an initial transmission of the user data. In this case, the value of the encoded information bits in the control channel field is representing a value of the first subset of values. Hence, ***in general, in case of an initial transmission, the transport format and optionally the redundancy version of the protocol data unit is indicated in the control channel signal***. As indicated previously***, the redundancy version may also be implicit to the transport format***. Ex.1, 7:58-67.

65. This disclosure teaches that the first subset of the value can "indicate" both the transport format and the redundancy version. But as the very next sentence make clear, this indication may be implicit. Thus "indicate" does not require explicit signaling or identification.

66. The specification also does not support an interpretation that "reserved for indicating [transport format or redundancy versions]" requires explicit signaling of only the

transport format or the redundancy version. For example, Table 4 teaches an implementation where the values in the TF range explicitly signal both the transport format and the corresponding redundancy versions. Ex. 1, 17:54-64, 18:30-40.

67. The example in Table 4 needs to be distinguished from that in Table 3. Table 3 is an example in which the transport format is "associated to [sic] a given fixed or preconfigured redundancy version." *Id.*, 15:31-38. In such a case with "fixed or preconfigured redundancy version," "one could speak of an explicit signaling of the transport format and a simultaneous implicit signaling of the redundancy version." *Id.*, 15:31-38; *see also*, 16:51-67. In contrast, Table 4 is an example where "the respective values/transport formats are associated to different redundancy versions," for which the conclusion that redundancy version is implicitly signaled does not apply as "redundancy versions may be defined depending on the actual signaling value." *Id.*, 17:21-25, 17:46-47, 17:57-59 ("the signaled value does not only identify a transport format of the protocol data unit but also ***indicates*** the respective redundancy version.").

68. The use of the word "indicate" in this example also supports a conclusion that "reserved for indicating" does not require explicit indication. For example, if the phrase "indicates the respective redundancy version" for the Table 4 implementation refers to explicit indication, then it is improper for Apple to exclude this preferred embodiment from the scope of claim 1 by excluding from the scope of "a first subset of the values is reserved for indicating the transport format of the protocol data unit" an embodiment in which the redundancy version is also explicitly signaled.

69. On the other hand, if the phrase "indicates the respective redundancy version" for the Table 4 implementation refers to implicit indication as Apple may be interpreting,

then the fact that the '284 patent used the word "indicate" to mean "indicate implicitly" would also dissuade a person of ordinary skill in the art to narrowly interpret "reserved for indicating" as requiring "explicitly signaled." either

70. I understand that Apple believes that Dr. Womack's infringement report, invalidity report and trial testimony supports its construction. I have reviewed the relevant passages, and the extrinsic evidence does not overcome the strength of the intrinsic evidence. For example, many relevant portions of Dr. Womack's expert reports and trial testimony related to (1) implementations such as Table 3 of the '284 patent and the LTE standard's TS 36.213 v 8.8.0, Table 8.6.1-1 where RV was implicitly signaled in the first subset of values because the transport format is associated with a given fixed or preconfigured redundancy version, or (2) rebuttal of Huawei expert's description of whether certain information is explicitly or implicitly signaled. Ex. 1, 15:31-37; Infringement report at ¶¶ 312-314 (pp. 209-212), ¶¶ 325-328 (pp. 220-222), ¶¶ 385-388 (pp. 265-266); Validity report at ¶¶ 96, 99-105, 108-110, Tr. Testimony at 74:14-18, 77:12-79:19, 82:2-84:16, 94:5-95:21. These passages do not reflect any inconsistent positions to what I express here.

71. In fact, Dr. Womack differentiated the situation where, as in Table 3, a parameter such as transport format is "indicated" in the first subset of values whereas the associated redundancy version is "predetermined." Tr. Transcript at 74:14-18, 78:6-12, 79:2-6.

72. I understand that Dr. Womack had the following exchange with Huawei's counsel (Tr. at 140:16-141:17):

> Q. (By Mr. Haslam) And you can look in your report – your invalidity report at Paragraph 105.
>
> [long exchange re objections]

. . .

Q. (By Mr. Haslam) If something explicitly signals both transport format and redundancy versions, it was your opinion that that would not be covered by the claims of the '284 patent, correct?

A. Yes.

Q. And that would be because there would be values for both transport format and redundancy version, correct?

A: Yes.

73. First, it is unclear what Dr. Womack meant when he answered "Yes" to the question "it was your opinion that that would not be covered by the claims of the '284 patent, correct." It is unclear whether "Yes" means "Yes, that was my opinion" or "Yes, it was covered by the claims of the '284 patent."

74. Second, this exchange occurs in relation to paragraph 105 of Dr. Womack's invalidity report, which states:

> 105. Even assuming that it is the transport format and redundancy version being source-encoded, the code word space would comprise a code word for every combination of redundancy version and transport format. The code words could be assigned so that the first code word corresponds to, for example, redundancy version 0 and transport format 0, the second code word corresponds to redundancy version 0 and transport format 1, and so on for each transport format, followed by the code words corresponding to redundancy version 1 and the respective transport formats. This would not be explicit signaling of transport formats ***or*** redundancy versions.

75. It is apparent, in this paragraph 105, Dr. Womack did not opine whether "[i]f something explicitly signals both transport format and redundancy versions," "that [would or] would not be covered by the claims of the '284 patent." All he opined was that the prior art

does not teach explicit signaling of either transport format or redundancy versions, contrary to what Huawei's expert opined. Validity report at ¶¶ 103-105.

76. During re-direct, Dr. Womack also testified regarding 15:31-38, and nowhere testified that his view is that indicating requires explicit signaling. Tr. Transcript at 146:20-148:5. Instead, he explained that it is significant that the indicated value of TF varies in Table 3 in the TF range, while the RV is constant in this same range. This testimony is to shed light on his cross-examination testimony in 140-141. As noted above, the cross-examination testimony was purportedly related to paragraph 105 of Dr. Womack's validity report, where he distinguished prior art that combined two values into a unique code word for every combination in a way inconsistent with the jointly encoded described by the 284 patent:

> Q. Can you explain again why in your opinion the -- the first subset that's highlighted in blue here is reserved for indicating the transport format?
>
> A. It's because the transport format values change from the range 0 through 12.
>
> Q. And what about the RV values?
>
> A. The redundancy version values do not change.
>
> Q. And is that significant?
>
> A. It is.
>
> Q. And let me -- let me point you, if I could, to the section of the patent that's quoted here in -- at Column 15, Lines 31 to 38, it's the bottom of the two quotes that are pulled up?
>
> A. Yes, sir.
>
> Q. And you see at the bottom that's underlined in red?
>
> A. Yes, sir.

Q. What's the significance of the -- of the discussion there of explicit signalling of the transport format versus implicit signalling of the redundancy version?

A. Well, according to the inventors, they say that you can view this as explicit signalling of the transport format and explicit [sic?] signalling of the redundancy version.

Q. And in the sentence -- in the sentence before that parenthetical, do you see reference to associated to a given fixed or pre-configured redundancy version?

A. Yes, sir.

Q. And is that the reason why you think it's significant that the redundancy version is staying the same is the key to the first subset indicating the transport format?

A. Yes, sir.

B. "processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and … wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field" (claim 1)

Term	Plaintiffs' Position	Apple's Position
"processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and . . .	No construction necessary. Plaintiffs do not believe Apple is justified to treat two disparate parts of claim 1 that are separated by two other claim elements as a single term. Further, the second part is not governed by § 112, ¶ 6 and is not indefinite. To the extent that the Court determines construction of this full term is necessary, Plaintiffs believe that the term must be expanded to include at least the entire clause, and identify the	Function: "determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and determining the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field" Structure: Indefinite under 35 U.S.C. § 112(6)

Term	Plaintiffs' Position	Apple's Position
wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field."	following functions, and corresponding structures, acts or materials for this clause: **Part I (as construed by the Court):** **Function:** "determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data" **Structure:** hardware programmed, or hardware with software programmed, according to an algorithm in which a determination of the transport format and the redundancy version is made such as described at 10:21-34 by determining the data within a joint field of a transmission such as shown and described in Figure 5, 12:55-58, 22:45-59 and that data is correlated to the transport format and redundancy version via tables such as Tables 3-8, and equivalents thereof. **Second Part:** **Function**: "determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, wherein a first subset of the values is reserved for indicating the transport format of the	

Term	Plaintiffs' Position	Apple's Position
	protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data" **Associated structure**: hardware programmed, or hardware with software programmed, according to algorithms in which a determination of the control information field is made by interpreting the control information field content, such as described in 6:65-8:54, 10:21-34, 12:55-58, 15:29-60, 16:46-21:3, 22:45-59, 27:61-28:12, Tables 3-8, Figs. 5, 8, 9, and equivalents thereof.	

77. I understand that Apple has proposed to construe the term "[1[b]] a processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, ... [1[e1]] wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field . . . ."

78. I understand that term actually consists of limitations from two disjointed parts of claim 1, 1[b] and 1[e1] (*see* paragraph 22), separated by elements 1[c] directed to a claimed transmitter and 1[d] specifying that the received control channel signal referenced in 1[b] comprises a control information field having jointly encoded transport format and

redundancy version. I also understand that Apple did not include in the term the remainder of element 1[e], which further characterizes the range of values represented in the control information: "wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data." Apple has not explained why it proposes to construe two separate parts of the claim and leave out a portion of element 1[e].

79. I understand that the Court has previously construed element 1[b] ("a processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data"), the first part of Apple's proposed construction. Specifically, the Court rejected Huawei's contention that the term is indefinite for having no corresponding structure, algorithm, or flowchart in the specification, and observed:

> Though Huawei contends no algorithms are disclosed, the Court finds otherwise. Specifically, Figure 5 provides exemplary channel signals that have a joint transport format and redundancy version (TF/RV) field. '284 Patent Figure 5, 12:55-58, 22:45-59. Tables 3-8 illustrate signaled values identifying joint transport format and redundancy version. In context of the specification, the processing unit detects these signaled values in the TF/RV field. The patent describes the control information field has this data jointly encoded, and the transport format and redundancy version are determined from the control information field. *Id.*10:21-34. Thus, as shown in the Figures and Tables, an algorithm for detecting transport format and redundancy version is provided in which data in a joint field of a transmission is detected to obtain a signaled value that correlates to a transport format and redundancy version.

Optis Wireless Tech., LLC v. Huawei Device Co., No. 2:17-CV-123-JRG-RSP, 2018 WL 476054, ECF No. 114 at 60, 66-67 (E.D. Tex. Jan. 18, 2018).

80. Based on its analysis, the Court construed 1[b] as follows:

> <u>Function</u>: "determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data"
>
> <u>Structure</u>: hardware programmed, or hardware with software programmed, according to an algorithm in which a determination of the transport format and the redundancy version is made such as described at 10:21-34 by determining the data within a joint field of a transmission such as shown and described in Figure 5, 12:55-58, 22:45-59 and that data is correlated to the transport format and redundancy version via tables such as Tables 3-8, and equivalents thereof.

Id. at 67.

81. I agree with the Court's analysis that the specification provides algorithms for determining a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data based on the received control channel signal. Specifically, Figure 5, Tables 3-8 and associated text disclose an algorithm for detecting transport format and redundancy version and this algorithm allows detection of signaled values transmitted in a jointly conceded common field and each of the signaled value correlates with a specific transport format and/or redundancy version. Further, I interpret the Court's finding of the corresponding structure as including text associated with Figures 5 and Tables 3-8.

82. As to the second part of Apple's proposed construction, I understand that PanOptis is of the opinion that if the term is to be construed, it should include 1[e2] for completeness. I offer no opinion whether this is correct from a legal perspective, but a person of ordinary skill in the art, reading the claim as a whole, would treat all of 1[e] "wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, [1e2] wherein a first subset of the values is

reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data" as a single part.

83. PanOptis has asked me to analyze if 1[e] is treated as a means-plus-function term, what is the function of the term and what is the corresponding structure, algorithm, or flowchart as disclosed by the specification, from the perspective of a person of ordinary skill in the art.

84. It is my opinion that a person of ordinary skill in the art would interpret the function of the term as "determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data."

85. I am also of the opinion that a person of ordinary skill in the art, reading the specification as a whole, would understand that the specification provides an algorithm to achieve the function. For example, as the Court has found in connection with 1[b], Figure 5 and Tables 3-8 data provide an algorithm in which "data in a joint field of a transmission is detected to obtain a signaled value that correlates to a transport format and redundancy version." *Optis Wireless Tech., LLC v. Huawei Device Co.*, No. 2:17-CV-123-JRG-RSP, 2018 WL 476054, ECF No. 114 at 66-67 (E.D. Tex. Jan. 18, 2018). This joint field is the claimed "control information field" because the specification teaches that:

> One main aspect of the invention is to suggest a new format for the control channel information. According to this aspect, the transport format/transport

> block size/payload size/modulation and coding scheme and the redundancy version/constellation version for the associated transmission of the user data (typically in form of a protocol data unit or transport block) is provided in a single field of the control channel information. ***This single field is referred to as the control information field herein, but may for example also be denoted a transport format/redundancy version field or, in abbreviated form, a TF/RV field.*** . . . .

Ex. 1, 6:65-7:14.

86. By detecting data (*i.e.*, bits) in the single jointly encoded TF/RV field, the processing unit determines the control information field. For example, as shown in Figure 5, the control channel signal consists of four fields, including the 4-bit joint TF/RV field. Each of the other three fields have a fixed number of bits as well. The processing unit can therefore determine the 4 bits that belong to the TF/RV field and thereby determine the control information field.

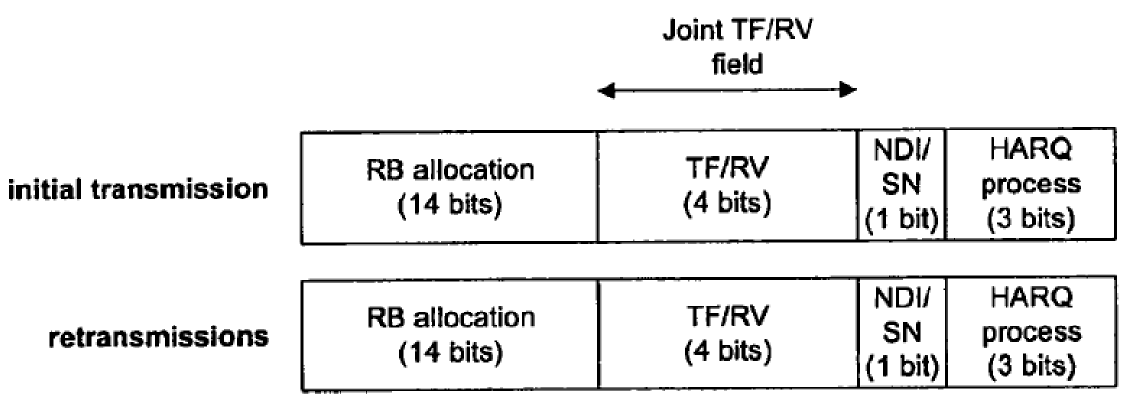


Fig. 5

87. Further, Tables 3-8 provide examples of the 4-bit TF/RV field, its range of signaled values and the fact that the range of the signaled values is divided into two subsets, a 13-member TF range reserved to indicate the transport format and a 3-member RV range reserved to indicate the redundancy value. For example, Table 3 provides a common field

consisting of 4 bits and 2^4=16 different signaled values represented in the field. Ex. 1, 16:60-67. This range of 16 values is divided into two subsets. *Id.* The first subset—TF range—is kept for the purpose of (though not exclusively for that purpose of) identifying different transport formats that are associated with RV0 for initial transmission. *Id.*, 16:60-67, 20:51-21:6. The second subset—RV range—is kept, though not exclusively, for the purpose of identifying a redundancy version of *e.g.*, a respective retransmission. *Id.*

TABLE 3

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	0	
0101	5	100	0	
0110	6	120	0	
0111	7	150	0	
1000	8	200	0	
1001	9	—	0	
1010	10	—	0	
1011	11	—	0	
1100	12	—	0	
1101	13	N/A	1	RV range
1110	14		2	
1111	15		3	

88. Implementations corresponding to Tables 4 and 8 are similar. *See* my description in paragraphs 38-39, 58-62.

89. Additional disclosures that teach "determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version

for transmitting the user data" include 6:65-8:54 (in particular, 6:65-7:8, 7:36-46), 10:21-34, 12:55-58, 15:29-60, 22:45-59, and 27:61-28:12.

90. Hence, contrary to Apple's contention, the specification provides a detailed algorithm to carry out the function.

IX. U.S. Pat. No. 8,005,154

91. I provide below my opinions on the proper constructions of the terms in dispute for the '154 patent.

A. "control information extractor for configuring transmission information for the downlink control channel via higher layer signaling" (claim 37)

Term	Plaintiffs' Position	Defendant's Position
"control information extractor for configuring transmission information for the downlink control channel via higher layer signaling" (claim 37)	Because the claim term itself recites sufficient structure (a "control information extractor"), Plaintiffs contend that this claim term does not invoke 35 U.S.C. § 112 ¶ 6. *See, e.g., Skky, Inc. v. MindGeek s.a.r.l.*, 859 F.3d 1014, 1019 (Fed. Cir. 2017) (citing *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (*en banc*)). Therefore, no construction is necessary, and the term should carry its plain and ordinary meaning, and is not subject to § 112 ¶ 6 and not indefinite. However, to the extent this term is found to be governed by § 112 ¶ 6, Plaintiffs propose the following construction: <u>Function</u>: "configuring transmission information for the downlink control channel via higher layer signaling" <u>Structure</u>: hardware programmed, or hardware with software programmed, to extract transmission information for the downlink control channel; for example, as shown and described in Figures 1, 2, 5, 6, and 8 and at 9:1-33, 11:12-65 and 12:33-58, and equivalents thereof.	Function: "configuring transmission information for the downlink control channel via higher layer signaling" Structure: Indefinite under 35 U.S.C. § 112(6)

92. I understand that the parties dispute the construction of "control information extractor for configuring transmission information for the downlink control channel via higher layer signaling," in claim 37 of the '154 patent. I understand that Plaintiffs contend that this term is not a means-plus-function term, is not indefinite, and should carry its plain and ordinary meaning. I understand that Apple contends that the term is indefinite. Having considered the parties' positions, I agree with Plaintiffs' interpretation.

<u>Means Plus Function</u>

93. It is my opinion that, in the context of the entire specification, a person of skill in the art at the time of the invention would have understood that a "control information extractor" denote sufficiently definite structure or acts for performing the function of "configuring transmission information for the downlink control channel via higher layer signaling."

94. To begin with, a "control information extractor" would have been a well understood term at the time of the invention. For example, in 2002, a few years before the invention, "extract" was defined by the Microsoft Computer Dictionary as "to remove or duplicate items from a larger group in a systematic manner." Microsoft Computer Dictionary at 203. This dictionary was widely available at the time of the invention, was representative of the understanding of persons of skill in the art, and was consulted by persons of skill in the art at the time of the invention. Based on my experience, a "control information extractor" would have had a definite meaning to a person of skill in the art as the name for structure.

95. Further, I note that others within the field of networking use the term "control information extractor" by persons of skill in the art to designate structure. For example, I

am familiar with the book "Quality of Service in Optical Packet Switched Networks" by Akbar Rahbar, published in 2015. This book describes network equipment where "control information… is extracted by the Control Information Extractor (CIE) unit and then sent to the controller, while the corresponding data are routed toward the switching module." Rahbar at 310. In Figure 5.17 of the book, the author depicts a network switch architecture with four units in the structure labeled "CIE" for "control information extractor." Rahbar at 311. This further confirms my understanding that the term "control information extractor" would have been understood by a person of skill in the art to have sufficiently definite meaning as the name for structure

96. This understanding of "control information extractor" is consistent with the function recited in the claim, "configuring transmission information for the downlink control channel via higher layer signaling." A person of skill in the art would understand that a control information extractor could extract information such as transmission information from a higher layer signal or other signal.

97. The figures and specification of the '154 patent also refer to "control information extractor" as the name for structure. For example, Figure 8 of the patent includes a "control information extractor" block:

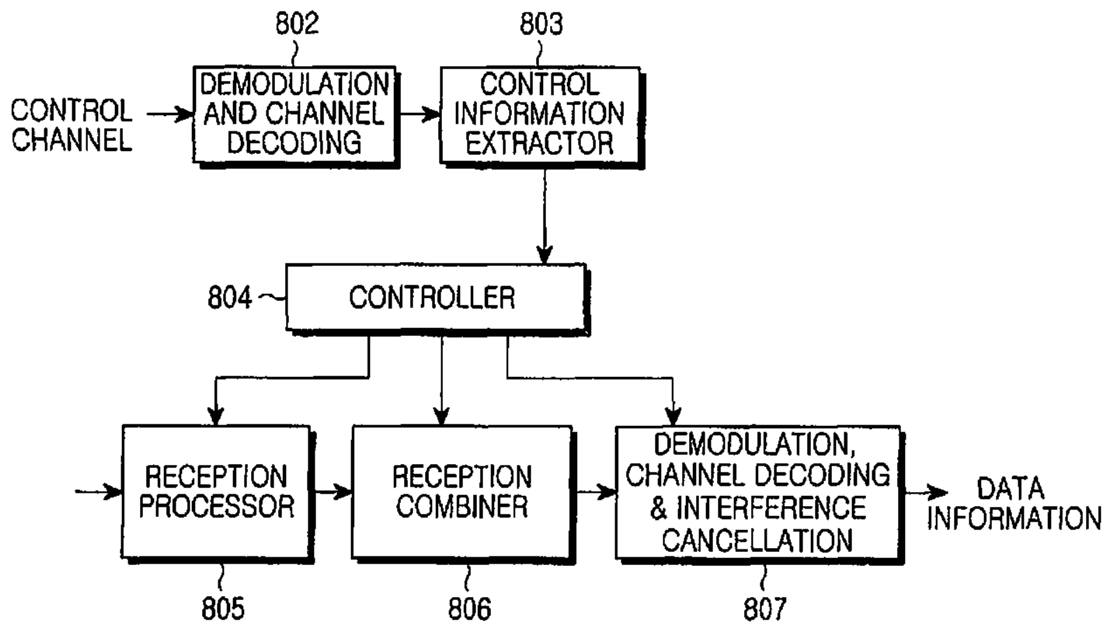


FIG.8

98. The description of Figure 8 similarly uses a "control information extractor" as the name for structure:

> Referring to FIG. 8, the receiver includes a demodulation and channel decoding unit 802, a control information extractor 803, a controller 804, a reception processor 805, a reception combiner 806, and a demodulation, channel decoding & interference cancellation unit 807.
>
> A control channel reception unit composed of the demodulation and channel decoding unit 802 and the control information extractor 803 extracts control information through a demodulation and channel decoding process on the signal received over a specific control channel. The extracted control information is input to the controller 804.

'154 patent at 12:35-45.

99. Accordingly, because the words "control information extractor" would be understood by persons of ordinary skill in the art to have a sufficiently definite meaning as

the name for structure, I agree with Plaintiffs' position that this claim term is not a means-plus-function term.

Structural Support If Means Plus Function

100. Plaintiffs have asked me to analyze, if this claim term were nonetheless to be treated as a means-plus-function term, what is the function of the term and what is the corresponding structure, algorithm, or flowchart as disclosed by the specification, from the perspective of a person of ordinary skill in the art.

101. In my opinion, a person of ordinary skill in the art would understand the function of this claim term to be "configuring transmission information for the downlink control channel via higher layer signaling," as literally recited in the claim. I understand this view to be consistent with both Plaintiffs' and Apple's positions.

102. It is my opinion that a person of ordinary skill in the art, reading the specification as a whole, would understand that the specification provides an algorithm sufficient to achieve this function.

103. For example, the patent shows a control information extractor in Figure 8:

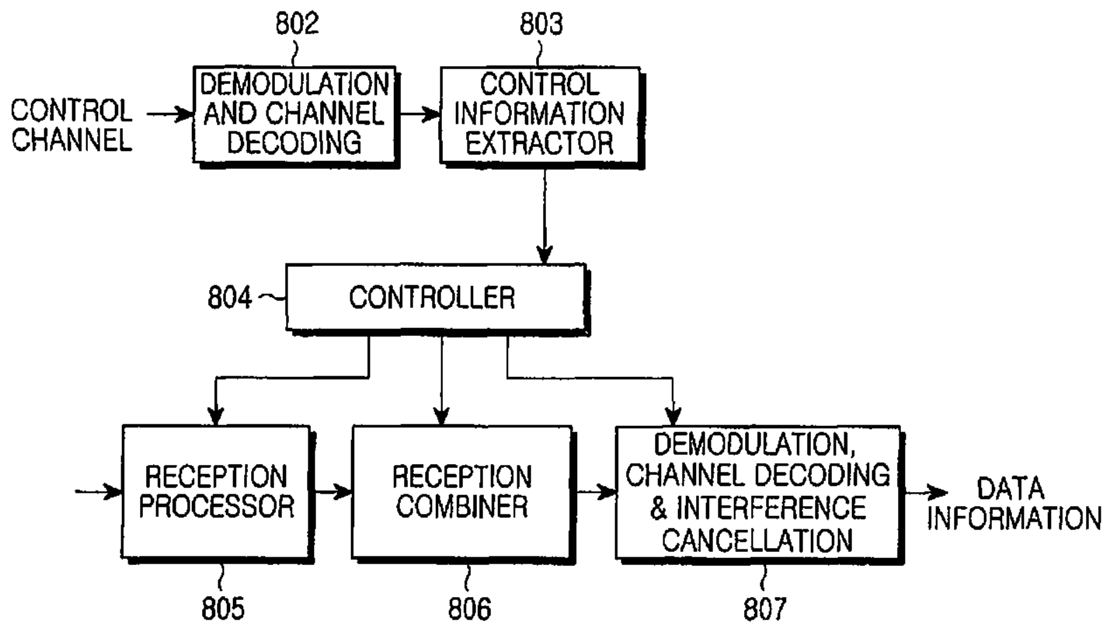


FIG.8

104. The description of Figure 8 similarly provides structure for the control information extractor:

> Referring to FIG. 8, the receiver includes a demodulation and channel decoding unit 802, a control information extractor 803, a controller 804, a reception processor 805, a reception combiner 806, and a demodulation, channel decoding & interference cancellation unit 807.
>
> A control channel reception unit composed of the demodulation and channel decoding unit 802 and the control information extractor 803 extracts control information through a demodulation and channel decoding process on the signal received over a specific control channel. The extracted control information is input to the controller 804.

'154 patent at 12:35-45.

105. In my opinion, a person of skill in the art would understand that the control information extractor disclosed above could extract information from a signal, and therefore provides structure for the claimed control information extractor. *See* '154 patent at 12:35-45.

106. Further, in my opinion, a person of skill in the art would understand how the control information extractor disclosed above could perform configuration "through a demodulation and channel decoding process on the signal received over the control channel" and therefore configures the controller by supplying the controller with "[t]he extracted control information." '154 patent at 12:43-45. This further provides support for the claimed "control information extractor for configuring transmission information." *See* '154 patent at 12:33-58.

107. Figure 5 of the patent, along with its description, describes how in one embodiment transmission information (which ultimately is extracted by the control information extractor) is generated and sent to the mobile device by the base station:

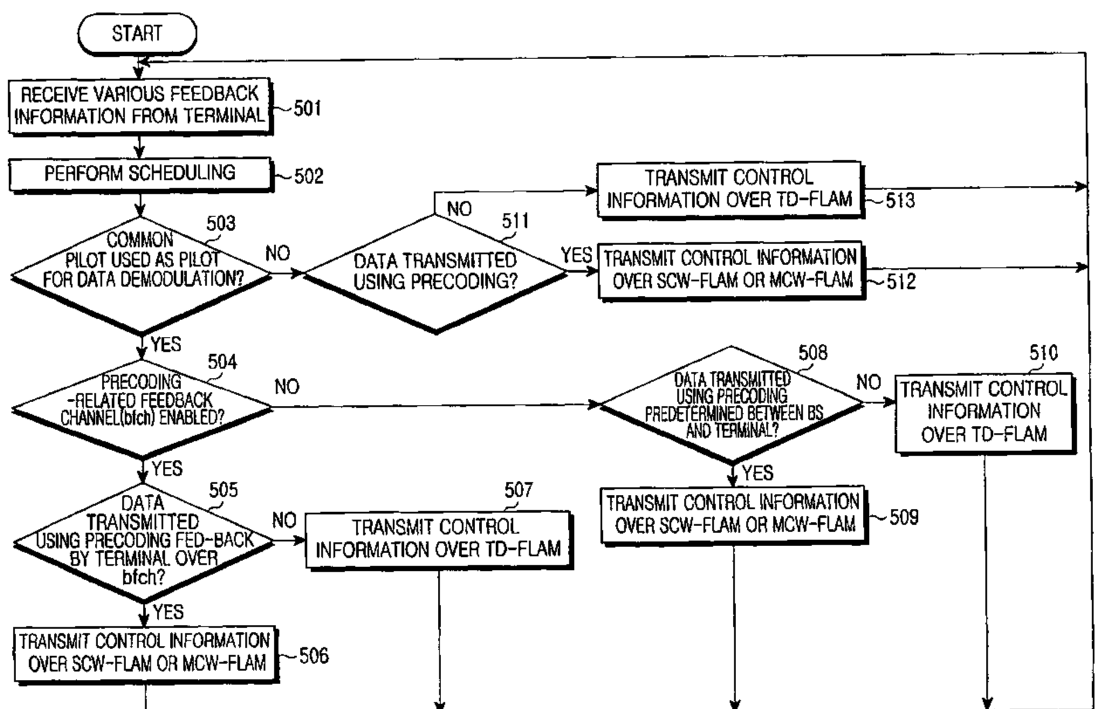


FIG.5

108. The description of Figure 5 notes that "Layer-3 signaling" is used to transmit control information between the base station and the terminal. *See* '154 Patent at 9:30-33.

109. The description of Figure 5 also shows that control information sent can include transmission information, such as information about whether transmit diversity or spatial multiplexing is used. For example, in one embodiment the base station may send TD-Scheme information indicating whether transmit diversity or spatial multiplexing is used:

> However, if it is determined in step 505 that the base station does not transmit the data using the precoding scheme recently fed back by the terminal over the BFCH during data the transmission to the scheduled terminal, the base station transmits control information to the terminal using TD-FLAM in step 507. The TD-FLAM is characterized in that it is defined to identify the TD technologies (including random beamforming) agreed upon between the base station and the terminal. As a detailed example, the 2-bit Rank field of Table 2 and the 2-bit TD-scheme field of Table 3 can be defined as follows.
>
> Embodiment 1 for Meaning of 2-Bit TD-Scheme Field
>
> 00: SISO (replaceable with SIMO according to the number of receive antennas of terminal)
>
> 01: STTD rate 1
>
> 10: STTD rate 2
>
> 11: Spatial Multiplexing (SM) (for rank 4)

'154 patent at 9:63-10:15 (*see also* 10:16-37).

110. Figure 6 describes an embodiment for how data is received:

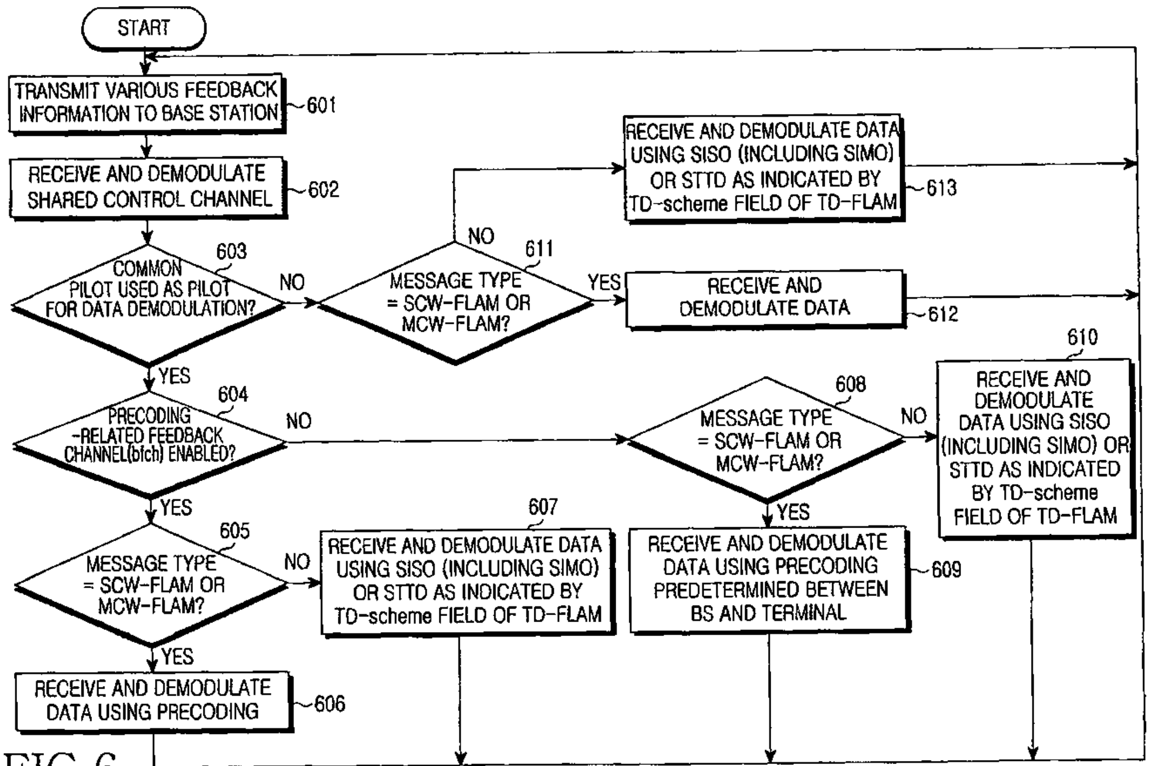


FIG.6

111. The description of Figure 6 further demonstrates how the extracted control information can be used to configure transmission information. For example, step 607 demodulates data based on received transmission information indicating the use of a transmit diversity scheme. *See* '154 Patent at 11:30-36; *see also* ‘'154 Patent at 12:64-67 ("when the data transmitter transmits the data by applying the SISO or STTD technology without applying the [precoding], the data receiver can detect the application of the SISO or STTD technology.")

112. Finally, Figures 1 and 2 of the '154 Patent provide additional detail by showing exemplary embodiments of the type of prior art communication systems in which the claimed invention can be used.

113. Hence, contrary to Apple's contention, if this were considered a means plus function claim term, the specification provides a detailed algorithm to carry out the function. In my opinion, a person of skill in the art would understand the structure of the claim. In my opinion, the structure could be fairly described as "hardware programmed, or hardware with software programmed, to extract transmission information for the downlink control channel; for example, as shown and described in Figures 1, 2, 5, 6, and 8 and at 9:1-33, 11:12-65 and 12:33-58, and equivalents thereof."

114. Further, as described above, in my opinion, this claim term would inform, with reasonable certainty, those skilled in the art about the scope of the invention.

X. U.S. Pat. No. 9,001,774

115. I provide below my opinions on the proper constructions of the terms in dispute for the '774 patent.[4]

A. "at least one of a time delay, a phase rotation and a gain" (claim 6)

Term	Plaintiffs' Position	Apple's Position
"at least one of a time delay, a phase rotation and a gain"	No specific construction necessary. However, Plaintiffs' position is that this term has a disjunctive meaning, requiring at least one of *any* of the three listed items alone or in some combination, and not requiring at least one of *all* three.	"at least one time delay, at least one phase rotation, and at least one gain"

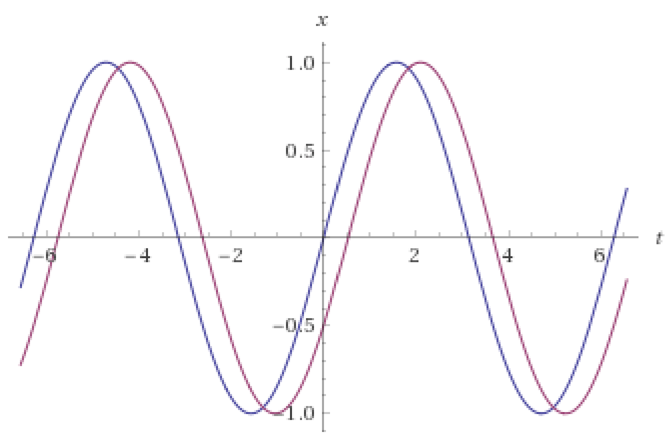
116. I understand that the parties dispute the construction of "at least one of a time delay, a phase rotation and a gain" in claim 6 of the '774 patent. I understand that Plaintiffs

[4] I understand that the parties have agreed that no construction is necessary for the term "based on a received uplink signal".

contend that the term has a disjunctive meaning, such that at least one of *any* of the three listed items alone or in some combination is sufficient. I understand that Apple, on the other hand, contends that the term should be construed as "at least one time delay, at least one phase rotation, and at least one gain."

117. As the '774 patent acknowledges, "[i]n general, a time delay in the time domain translates into a phase rotation in the frequency domain." '774 Patent at 10:26-30.

118. For example, in the following time-domain plot, sin(t) is shown in blue, and sin(t-30°) (the same function with a phase rotation of 30 degrees) is shown in purple.



119. It is evident from the plot that the phase-rotated purple wave is equivalent to the original blue wave plus a short time delay. This illustrates that a time delay (in the time domain) and phase rotation (in the frequency domain) are generally equivalent, i.e. in linear systems theory a delay in the time domain corresponds to a linear phase term (phase rotation) in the frequency domain.

120. Most of the specification of the '774 Patent refers to a gain and a time delay, without using the term "phase rotation." *See, e.g.,* '774 Patent at 1:52-56, 1:61-64, 1:67-2:6, 2:13-59, 6:30-35, 7:3-22, 7:52-59, 8:21-24, 9:9-16, 9:35-38, 9:52-57, 10:1-4. However, at

the very end, the specification explains that "the compensation can **either** be done on the time domain OFDM symbol or directly in the frequency domain." '774 Patent at 10:21-23 (emphasis added). "Therefore, the OFDM subcarriers carrying the pilot symbols may be appropriately phase rotated in the frequency domain to account for time delay." '774 Patent at 10:28-30.

121. Moreover, I have reviewed U.S. patent application No. 11/327,799 (the "'799 Application"), incorporated by reference in the '774 specification. I see nothing in the '799 Application to indicate that all three of a gain, a time delay, and a phase rotation are simultaneously used. To the contrary, like the '774 patent, the '799 application explains how instead of applying a time delay in the time domain, "[i]n the frequency domain, ACDD may be implemented by applying the equivalent phase shift ($e^{-j2\pi k D_m/N}$) corresponding to a certain delay D_m." '799 Application at ¶ 0059.

122. I have also reviewed U.S.provisional patent applications Nos. 60/673,574, 60/673,674, and 60/679,026. I see nothing in these applications to indicate that all three of a gain, a time delay, and a phase rotation are simultaneously used.

123. In my opinion, based on the above portions of the specification, a person of ordinary skill in the art would understand that a phase rotation is plainly disclosed as an *alternative* way of implementing a time delay rather than something to be implemented *in addition* to a time delay. This is inconsistent with Apple's construction requiring *both* "at least one time delay" *and* "at least one phase rotation.

124. Figure 3 of the patent illustrates this principle as well:

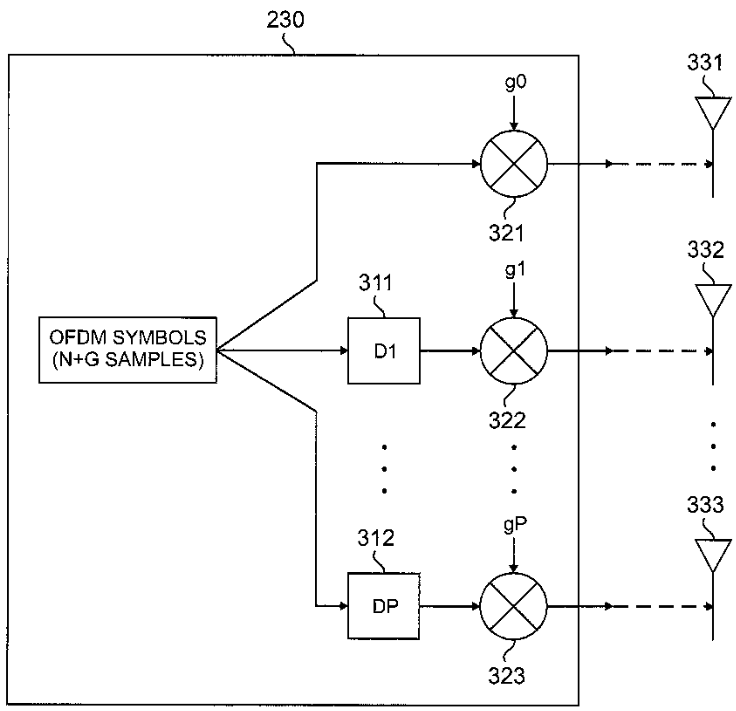


FIG. 3

125. In this figure, for the antenna on top (331), only a gain is applied (in element 321). *See* '774 Patent at 6:56-7:16. For the remaining antennas, both delays (in elements 311-312) and gains (in elements 322-323) are applied. None of the paths have a *third* element for phase rotation.

126. In summary, no disclosed embodiment in the specification shows the separate application of both a time delay and a phase rotation. Rather, the specification makes clear that the two are alternatives. Therefore, in light of the specification, my opinion is that the only interpretation that a person of skill in the art could reasonably arrive at is that the phrase "at least one of a time delay, a phase rotation and a gain" has a disjunctive meaning that does not require all three, but rather at least one of *any* of the three listed items alone or in some combination is sufficient.

I declare under the penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge. Executed on this 12th day of December, 2019 in University Park, Pennsylvania.

By: Mark W Mahon

Mark Mahon, Ph.D.

APPENDIX A

Mark P. Mahon, Ph.D.
School of Electrical Engineering and Computer Science
W209A Westgate Bldg.
Pennsylvania State University
University Park, PA

Highlights

Teaching faculty experienced in research and systems development in cellular and mobile wireless networks, wireless local area networks, wireless network security, mobility management, mobile data systems including networks, protocols, and applications, wideband signal processing, modulation theory, algorithms, mathematical/analytical modeling, communication, detection and estimation, and control systems. Pursues funding for and conducts advanced research in: computer and mobile networks, theoretical and experimental analysis of communication systems, cellular, wireless, and mobile systems, wideband signal processing, sensors, tracking, localization, and data fusion. Experienced in hardware/software development, data acquisition, integration, and testing, field test planning, preparation, and execution. Extensive programming experience including UI, analysis tools, real-time object oriented programming, and embedded systems code development in C, C++, python, java, and assembly.

Education

PhD. Acoustics, The Pennsylvania State University, University Park, PA 16802, 2001
M.S. Electrical Engineering, The Pennsylvania State University, University Park, PA, 16802, 1991
B. S. Electronics Engineering, The University of Scranton, Scranton, PA, 18510, 1987

Employment

Aug. 2015 – Present: *Associate Teaching Professor, School of Electrical Engineering and Computer Science, The Pennsylvania State University, University Park, PA 16801*
Teach graduate and undergraduate courses in computer science and electrical engineering such as communication networks, mobile networks, programming, mathematics, and wireless security. Advise and direct graduate students' MS and PhD research in the areas of networks, wireless and cellular networks, and cyber security. HackPSU and BlockChain@PSU faculty adviser, member of graduate advising committees, member of computer science undergraduate Curriculum Committee, member of School of EECS Management Committee, advise undergraduate electrical engineering, computer science, computer engineering, and data science students.

2003 – Aug. 2015: *Associate Research Professor, Applied Research Laboratory, Communications, Information, and Navigation Office, The Applied Research Laboratory, The Pennsylvania State University, State College, PA* Principal Investigator, Co-Principal Investigator, Technical lead conducting research on cellular and mobile networks, network security, mobile communication systems, data fusion, and wideband signals and image processing with total funding over $12M.

2002 – 2003: *Sr. Systems Engineer, Klein & Stump, Inc., 2120 Washington Blvd. #400, Arlington, VA 22204*
Researcher and technical consultant working on wireless communications projects for US Special Operations Command (SOCOM) and Naval Information Warfare Activity (NIWA). Awarded $150k SBIR for SOCOM advanced signal simulator.

1991 – 2002: *Assistant Research Professor, Applied Research Laboratory, Communication Sciences and Technology Division, The Applied Research Laboratory, The Pennsylvania State University, State College, PA 16804* Principal Investigator and researcher conducting research on cellular and mobile networks, wideband signals, tracking and localization, adaptive signal processing, acoustic propagation, sensor systems, remote sensing, and active noise control. Awarded $750k for development of novel wavelet based wideband signal detection for high altitude sensors.

1988 – 1989: *Program Engineer, Central Intelligence Agency, Langley, VA 22101*
Assisted in the development of algorithms and signal processing systems for novel applications in the areas of RF communications and signal modulation techniques

Detailed Research Experience:

2015 – Present
Lead graduate and undergraduate student research in wireless communication networks, distributed video processing, software defined network security, application of game theory to cyber resiliency, wireless communication systems and security, machine learning, big data analytics, and artificial intelligence for mobile and computer network security.

2014 – 2015
Leading internal research and development effort on deep packet inspection for zero day and predictive detection for data networks. Technical performer developing novel deformable wavelet based contour matching technique for automated object detection in satellite images.

2014
Developed real-time scanner for 802.15.4 (LR-WPAN) protocol deployed on software defined radio platform.

2013-2014
Technical lead on developing novel mathematical model for analyzing torpedo threat surrogate systems for US Navy. Experimental lead on disposable, adaptive, high bandwidth fiber-optic undersea communication system for US Navy.

2013
Implemented a novel matched filter receiver for a unique OFDM signal of interest to facilitate signal detection in a high co-channel interference environment of a wide field of view high altitude receiver and wideband signal set design in highly complex propagation environments for Department of Defense (DoD).

2012-2013
Technical lead for design and implementation of a real-time transmitter/receiver on a software defined radio platform for maritime communication systems (Automatic Information System/Maritime Security).

2012
Communications/signal processing technical consultant on Maritime Domain Operations and Unmanned Surface Ship Interdiction study effort for US Navy.

2011-2012
Principal Investigator, technical and experimental lead on fiber optic undersea communication system for Advanced Submarine System Development effort for US Navy.

2011
Technical lead on mathematical analysis, algorithm development, and implementation of pattern of life signal to noise ratio analysis in high co-channel interference environment for DoD.

Trusted agent for Army Research Lab to review and critically analyze work associated with wideband signaling and passive emissions collection from cell phones. Reviewed contractor data analysis and technical briefings for scientific accuracy and rigor. Advised the sponsor on contractor testing methodologies, procedures, and analysis techniques.

Technical lead implementing unique wideband acoustic communication system and specialized signal processing hardware for an acoustic system being utilized in a complex maritime environment for the DoD.

2009 – 2010
Tiger team lead for large unmanned undersea vehicle (UUV) assigned to identify platform induced electromagnetic interference with electronic payload system in the HF regime for the US Navy.

Developed and implemented a novel algorithm to calculate the effective force charge based on muzzle sensor data utilizing MEMS transducers and PIC controller on a portable howitzer for the US Army.

Conducted study and authored Intelligence, Surveillance, and Reconnaissance (ISR) for Unmanned/Minimally Manned Undersea Vehicle (UMUV) report presented to Defense Advanced Research Projects Agency (DARPA).

2006 – 2009
Principal Investigator for a multi-year research and FPGA-based engineering prototype development effort in the area of 3G/4G (UMTS/LTE) cellular and wireless (IEEE 802.16 and 802.11) communication systems; Effort consisted of three phases: theoretical and analytical study, proof-of-concept development, and testing, and prototype development for DoD.

2005-2006
Technical lead on Information Fusion engine integration into a sandbox enclave at Joint Interagency Task Force South (JIATF-S) to support multi-int data fusion

2003 – 2006
Principal Investigator for multi-year Office of Secretary of Defense sponsored research program in the area of multi-intelligence data fusion as part of the overall initiative of Force Transformation; worked extensively with NGA, DIA, DISA, OSD, all military services, and some coalition components.

2002 – 2003
Pursued funding for research interests in the areas of wireless/wideband communications, wideband systems, source detection/localization, intelligent system of systems design, and data fusion; Awarded Phase I, Small Business Innovative Research contract for Portable Signal Training System by SOCOM (02-013); Technical consultant for Naval Information Warfare Center on Common for High Performance Computing Software Support Initiative’s (CHSSI) Electronic Battlefield Environment (EBE) portfolio (Electromagnetic Environmental Effects Toolkit), SBIR, MERIT/TENCAP, TST programs

1998 – 2002
Researcher and principal investigator performed research in large time-bandwidth product (wavelets) source detection and localization – theoretical, analytical, and field testing; CDMA IS-95A/3G cellular communications; Developed mathematical analytical models and included code development of the CDMA air interface physical layer implementing major aspects of the CDMA protocol for test and analysis purposes; Built real-time hardware platform for deploying developed CDMA physical layer code.

1997 – 1998
Principal Investigator in charge of signal processing algorithm and code development, image acquisition and compression, telephony, and user interface design for an experimental remote, autonomous, acoustic rockslide detection for Conrail. Work included algorithm and code development utilizing embedded digital signal processing (DSP) board and development of unique algorithms for real-time monitoring of transducers to create an event detection system.

1991 – 1997
Performed fundamental research in the areas of signal processing algorithm development, acoustic atmospheric propagation, detection, source localization, beamforming, system identification, and active control; Main responsibilities include real-time code development (C, Visual C++, assembly) for signal processing systems, adaptive beamforming, and embedded processing for eight major projects during this time. Multiple DSP platform development; Active Noise Control, feature extraction, data logging and fusion, passive acoustic tracking, beamforming, and analysis for these projects

1988-1989
Assisted in the development of algorithms and signal processing systems for novel applications in the areas of RF communications and signal modulation techniques.

Case History:

March 2019 – Present; Gibson, Dunn, & Crutcher, LLP
Consulting for defendant on patents involving LTE downlink cell search and synchronization signaling. Assist with non-infringement analysis and claim construction.

2016 – March 2019, Sidley Austin, LLP
Consulting for plaintiff on original complaint and for defendant on counter-claims on patents involving control channel signaling, network access, and security. Assisted claim construction, IPR petition and preliminary response, infringement, validity, invalidity, non-infringement reports. Deposed on IPR, claims, and counter-claims.

2016 Russ, August & Kabat
Consulted on patents with respect to cellular network protocols. Wrote infringement and validity reports and rebuttals. Performed source code review and conformance testing. Deposed.

2015 - 2016 Hueston & Hennigan
Consulted for plaintiff on patents with respect to cellular user interface. Present at jury trial and participated in mock jury trial. Wrote rebuttal expert report on validity and deposed on the same. Wrote infringement report regarding cellular protocols. Performed source code review and conformance testing.

2015 Bunsow De Mory Smith & Allison
Consulted for plaintiff on patents with respect to cellular protocols. Wrote declarations on claim construction. Prepared tutorial to be presented to court. Retained by client when case was handed off to Hueston & Hennigan.

Teaching Experience:

CMPEN 462 Wireless Communications and Security
CSE 514 - Communication Networks
CSE 516 - Mobile Networks
CMPEN 497 – Wireless Communications and Security
EE/CMPEN 362 - Communication Networks
Math 141 - Calculus with Analytical Geometry II
CMPSC 101 – Programming in C++
ACS 505 – Experimental Techniques in Acoustics
Graduate student research advisor
Undergraduate Honors College student research advisor

Open Publications:

Swanson, Mahon, Norris, and Mast, "Atmospheric Multipath Resolution Using Spread Spectrum Acoustic Signals", *Proceedings of Meetings on Acoustics,* accepted September 2017.

Aquaviva, Mahon, Einfalt, and LaPorta, "Optimal Cyber-Defense Strategies for Advanced Persistent Threats: A Game Theoretic Approach," *2017 International Symposium on Reliable and Distributed Systems,* Hong Kong, China, September 27 – 29, 2017.

Young, Mahon, and Wyckoff, "Automated Information Management," Chap. 12, *Mathematical Techniques in Multisensor Data Fusion,* Hall, David L., Artech House Inc., Mar 2004

Mahon, Sonsteby, and Wenchel, "Application of Non-Orthogonal Waveletes for Geolocation," *Radiolocation and Direction Finding Symposium*, Southwest Research Institute, San Antonio, Texas, 2-4 Nov. 1999.

Myers, Lovette, Kilgus, Giannini, Swanson, Reichard, Mahon, Mast, "A Java-based Information System for Wayside Sensing and Control," *Proc. of the 1998 ASME/IEEE Joint Railroad Conference,* 1998, pp. 135-147.

Mast, Swanson, Mahon, Norris, "Resolution of multipath outdoor sound propagation using spread spectrum signals," *J.Acoustic. Soc. Am.*, *Volume 101, Issue 5,* 1997

Swanson, Mast, Mahon, "Atmospheric Multipath Resolution Using Spread Spectrum Acoustic Signals," *Proceedings of the 133rd Meeting of the ASA*, June 15-20, 1997.

Mahon, Swanson, "Acoustic Holography as an Active Control Measurement Tool," *Proceedings of Active 95, The 1995 International Symposium on Active Control of Sound and Vibration,* Newport Beach, CA, July 1995, pp. 673-684.

Mahon, Sibul, Valenzuela, "A Sliding Window Update for the Basis Matrix of the QR Decomposition," *IEEE Transactions on Signal Processing,* May 1993, pp. 1951-1953.

Mahon, Sibul, Valenzuela, "An Alternative Updating Scheme for the QR Algorithm as Applied to Adaptive Beamforming," *Proc. 25th Annual Conf. on Info. Sciences and Systems,* Johns Hopkins University, Baltimore, MD, March 1991, pp. 193-199.

Awards/Honors:

Senior Member IEEE

2001 Formal citation letter from National Reconnaissance Office (NRO) for experimental work with mobile wireless systems

2001 Formal citation letter for excellence in software development from the NRO for work associated with mobile wireless systems

2000 Formal citation letter from NRO for development of wavelet course presented at NRO Technology Symposium

1997 Invited session chair of "Signal Processing in Acoustics: General Signal Processing," *Noise-Con '97, 133rd meeting of the ASA*

1996 *Simowitz Citation* Acoustics Department PSU for outstanding publication by a graduate student

1995 Invited co-chair of "Transducers for Active Control of Sound and Vibration," *Active 95, Active Noise Control Conference*

1993 *Simowitz Award* Acoustics Department PSU for outstanding publication by a graduate student

1987 *Dr. A. J. Cawley Award for Excellence in Electronics Engineering* by Physics/EE Department University of Scranton

APPENDIX B

Materials Considered

- U.S. Patent No. 8,385,284
- PCT/EP2008/010845
- Prosecution History of U.S. Patent No. 8,385,284
- Plaintiffs Optis Wireless Technology, LLC, Optis Cellular Technology, LLC, and PanOptis Patent Management, LLC's P.R. 4-2 Disclosures (C.A. No. 19-CV-66, E.D. Tex. Nov. 14, 2019)
- Defendant Apple Inc.'s P.R. 4-2 Second Amended Proposed Preliminary Claim Constructions and Extrinsic Evidence (C.A. No. 19-CV-66, E.D. Tex. Dec. 4, 2019)
- Optis Wireless Technology, LLC, Optis Cellular Technology, LLC, and PanOptis Patent Management, LLC's Opening Claim Construction Brief (Dkt. No. 94, C.A. No. 17-CV-123, E.D. Tex. Oct. 20, 2017)
- Declaration of Alexander M. Haimovich, Ph.D. Regarding Claim Construction (Dkt. No. 94-2, C.A. No. 17-CV-123, E.D. Tex. Oct. 20, 2017)
- Defendants Huawei Device USA Inc. and Huawei Device Co., Ltd.'s Claim Construction Brief in Response (Dkt. No. 101, C.A. No. 17-CV-123, E.D. Tex. Nov. 3, 2017)
- Declaration of Harry Bims, Ph.D. Regarding Claim Construction of U.S. Patent Nos. 6,604,216, 8,385,284, and 8,437,293 (Dkt. No. 101-1, C.A. No. 17-CV-123, E.D. Tex. Nov. 3, 2017)
- Claim Construction Memorandum Opinion and Order (Dkt. No. 114, C.A. No. 17-CV-123, E.D. Tex. Jan. 18, 2018)
- Expert Report of Dr. James E. Womack Regarding Infringement of United States Patent Nos. 8,208,569 and 8,385,284 (C.A. No. 17-CV-123, E.D. Tex. March 26, 2018)
- Rebuttal Expert Report of Dr. James E. Womack Regarding Validity of U.S. Patent Nos. 8,208,569 and 8,385,284 (C.A. No. 17-CV-123, E.D. Tex. April 23, 2018)
- Transcript of Jury Trial Before The Honorable Chief Judge Rodney Gilstrap, Afternoon Session (C.A. No. 17-CV-123, E.D. Tex. August 21, 2018)
- U.S. Patent No. 8,005,154
- Prosecution History of U.S. Patent No. 8,005,154
- Translation of priority application KR 10-2006-0133210 (APL-UPPO_000584309 - PL-UPPO_000584351).

- Microsoft Computer Dictionary, Fifth Edition (2002), at 203.
- Rahbar, "Quality of Service in Optical Packet Switched Networks," at 310-311.
- U.S. Patent No. 9,001,774
- Prosecution History of U.S. Patent No. 9,001,774
- U.S. Patent Application No. 11/327,799 (published as US 2006/0239180 A1)
- U.S. Provisional App. No. 60/673,574
- U.S. Provisional App. No. 60/673,674
- U.S. Provisional App. No. 60/679,026

APPENDIX C

IN THE UNITED STATES DISTRICT COURT
FOR THE EASERN DISTRICT OF TEXAS
MARSHALL DIVISION

OPTIS WIRELESS TECH., LLC, ET AL., Plaintiffs, v. HUAWEI DEVICE CO. LTD., ET AL., Defendants.	CIVIL ACTION NO. 2:17-cv-123-JRG-RSP

CLAIM CONSTRUCTION
MEMORANDUM OPINION AND ORDER

On December 1, 2017, the Court held an oral hearing to determine the proper construction of the disputed claim terms in the following U.S. Patents Nos. 6,604,216 (the "'216 Patent"), 7,769,238 (the "'238 Patent"), 7,940,851 (the "'851 Patent"), 8,358,284 (the "'284 Patent"), and 8,437,293 (the "'293 Patent"). The Court has considered the parties' claim construction briefing (Dkt. Nos. 94, 101, and 102) and arguments. Based on the intrinsic and extrinsic evidence, the Court construes the disputed terms in this Memorandum and Order. *See Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831 (2015).

BACKGROUND

Plaintiffs Optis Wireless Technology, LLC, Optis Cellular Technology, LLC and PanOptis Patent Management, LLC (collectively "PanOptis") has asserted seven patents against Defendants

Huawei Device USA Inc. and Huawei Device Co., Ltd. (collectively “Huawei”). Five of the seven asserted patents have terms in dispute: the ’216 Patent, the ’238 Patent, the ’851 Patent, the ’284 Patent and the ’293 Patent.

The ’238 Patent relates generally to encoding and decoding video. The Abstract of the ’238 Patent recites:

> The method includes the following units: a coefficient number detecting unit (109) for detecting the number of coefficients which has a value other than 0 for each block according to the generated coefficient, a coefficient number storing unit (110) for storing the number of coefficients detected, a coefficient number coding unit (111) for selecting a table for variable length coding based on the numbers of coefficients in the coded blocks located on the periphery of a current block to be coded with reference to the selected table for variable length coding so as to perform variable length coding for the number of coefficients.

’238 Patent Abstract. More particularly, the ’238 Patent describes prior art techniques of dividing a picture into blocks. Data compression techniques are then applied to the blocks. *Id*. at 1:18-27. This may result in a representation of the data as a matrix of coefficients, having zero and non-zero coefficients. *Id*. at 28-38. A variable length coding (VLC) table is used to encode the information by providing the number of non-zero coefficients in a block with a code number. The ’238 Patent describes the use of multiple VLC tables. *Id*. at 10:5-11:10. Based upon a prediction of a block, a different VLC table is chosen for use for a particular block. *Id*.

The ’216 Patent relates generally to techniques for redundancy error correction in telecommunication transmissions. ’216 Patent 1:15-21. The Abstract of the ’216 Patent recites:

> A wireless communications system, transmitter, receiver and method are provided that are capable of supporting incremental redundancy error handling schemes using available gross rate channels. More specifically, the transmitter includes a coding circuit for coding a digital data block and generating a mother code word, and a reordering circuit for reordering the mother code word and generating a reordered mother code word. The transmitter also includes a modulating circuit for modulating at least one subsequence each of which has a desired number of bits taken from the reordered mother code word to fill the available bandwidth of at least one available gross rate channel. The transmitter continues to forward the

> modulated subsequences to the receiver until the receiver successfully decodes the digital data block.

Id. at Abstract. More particularly, the ’216 Patent describes that a digital data block is coded to generate a mother code word which is then reordered. *Id*. at 4:32-36. A subsequence of the reordered mother code word may then be transmitted. The number of bits of the subsequence is chosen so as to fit the available bandwidth of a gross rate channel over which the data is transmitted. *Id*. at 36-46.

The ’851 Patent relates generally to sending channel quality information (CQI) reports between a wireless receiving unit and a transmitting unit. ’851 Patent 1:5-56. The Abstract of the ’851 Patent recites:

> A radio communication apparatus and an associated method are provided. The apparatus includes a receiving unit configured to receive first data and second data, which are transmitted from a plurality of antennas for spatial-multiplexing using a plurality of blocks, into which a plurality of consecutive subcarriers in a frequency domain are divided. The apparatus further includes a calculating unit configured to calculate a first absolute CQI value per each of the blocks for the first data and a second absolute CQI value per each of the blocks for the second data, and calculate a relative value of the second absolute CQI value with respect to the first absolute CQI value, per each of the blocks. The apparatus still further includes a transmitting unit configured to transmit the first absolute CQI value and the relative value of the second absolute CQI value in the same block.

Id. at Abstract. More particularly, the ’851 Patent describes that increasing the amount of CQI provided between a receiver and transmitter can undesirably consume system resources. *Id* at 1:45-56. The ’851 Patent describes data being sent in blocks or “chunks.” *Id*. at 6:1-9, Figure 4. The CQI sent for streams of data may be reduced by sending an absolute CQI value for one stream (the “reference” stream) and only sending relative CQI values for the other streams. *Id*. The relative CQI may be given as a value relative to the absolute value of the reference stream. *Id*. at 6:1-21. Because the amount of information in the relative CQI data may be less than the absolute CQI data, the amount of CQI data sent may be less.

The ’284 Patent relates generally to control information provided on a control channel between a mobile station and a base station. The Abstract of the ’284 Patent recites:

> The invention relates to a method for providing control signalling associated to a protocol data unit conveying user data in a mobile communication system and to the control channel signal itself. Furthermore, the invention also provides a mobile station and a base station and their respective operation in view of the newly defined control channel signals defined herein. In order to reduce the control channel overhead, the invention suggests defining a common field for the transport format and redundancy version in the control channel information format. According to one approach, the common field is used to jointly encode transport format and redundancy version therein. According to another aspect, one shared field is provided on the control channel signal that indicates either a transport format or a redundancy version depending of whether the control channel signal relates to an initial transmission or a retransmission. In another embodiment, further enhancements to a HARQ protocol are suggested for addressing certain error cases.

’284 Patent Abstract. More particularly, the ’284 Patent describes that in the prior art it was known that control signaling information sent between a base station and mobile station included the “transport format” and the “redundancy version.” *Id*. at 3:21-4:21. The ’284 Patent describes a method in which the control channel information is formatted in a manner such that the transport format and redundancy version information is provided in a single field in the control channel information. *Id*. at 6:65-7:14. Further, the control channel information field bits may provide joint encoding of the transport format and redundancy version. *Id*. at 7:15-22.

The ’293 Patent relates generally to scheduling the transmission of information between a mobile terminal (UE) and a base station. The Abstract of the ’293 Patent recites:

> Aspects of the present invention relate to the scheduling of resources in a telecommunication system that includes a mobile terminal and base station. In one embodiment, the mobile terminal sends an initial scheduling request to a base station. Subsequently, the mobile terminal does not transmit a scheduling request to the base station unless and until a scheduling request triggering event is detected.

’293 Patent Abstract. More particularly, the ’293 Patent describes that it is known in the prior art that when a transmit buffer of a mobile terminal has information to send, the mobile terminal may

send a scheduling request (SR) to the base station. The base station may then assign resources to the mobile terminal over which to transmit the data by sending a scheduling grant (SG) to the mobile terminal. After the grant of resources, the mobile terminal may also send a buffer status report that contains more information on the buffer status than included in the scheduling request. *Id*. at 1:48-2:61, Figures 2 and 3. The ’293 Patent describes an addition to the process in which a scheduling request trigger event is used. After transmitting buffer status information to a base station, the mobile terminal may determine that a scheduling request triggering event has occurred. The scheduling request triggering event may be based on determining (1) if additional data has become available to send, (2) an amount of time has elapsed since the first scheduling request, or (3) the amount of data in the transmit buffer exceeds a threshold. If a scheduling request trigger event occurs, then the mobile terminal transmits a second scheduling request to the base station. *Id*. at 3:5-33.

LEGAL PRINCIPLES

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To determine the meaning of the claims, courts start by considering the intrinsic evidence. *Id.* at 1313; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. The general rule—subject to certain specific exceptions discussed *infra*—is that each claim term is construed according to its ordinary and accustomed meaning as understood by one of

ordinary skill in the art at the time of the invention in the context of the patent. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014) ("There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.") (vacated on other grounds).

"The claim construction inquiry. . . begins and ends in all cases with the actual words of the claim." *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998). "[I]n all aspects of claim construction, 'the name of the game is the claim.'" *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014) (quoting *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998)). A term's context in the asserted claim can be instructive. *Phillips*, 415 F.3d at 1314. Other asserted or unasserted claims can also aid in determining the claim's meaning, because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term's meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314–15.

"[C]laims 'must be read in view of the specification, of which they are a part.'" *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). But, "'[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims.'" *Comark Commc'ns, Inc.*

v. Harris Corp., 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *see also Phillips*, 415 F.3d at 1323. "[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

The prosecution history is another tool to supply the proper context for claim construction because, like the specification, the prosecution history provides evidence of how the U.S. Patent and Trademark Office ("PTO") and the inventor understood the patent. *Phillips*, 415 F.3d at 1317. However, "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* at 1318; *see also Athletic Alternatives, Inc. v. Prince Mfg.*, 73 F.3d 1573, 1580 (Fed. Cir. 1996) (ambiguous prosecution history may be "unhelpful as an interpretive resource").

Although extrinsic evidence can also be useful, it is "'less significant than the intrinsic record in determining the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert's conclusory, unsupported assertions as to a term's definition are entirely unhelpful to a court. *Id.* Generally, extrinsic

evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id.* The Supreme Court recently explained the role of extrinsic evidence in claim construction:

> In some cases, however, the district court will need to look beyond the patent's intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period. *See, e.g., Seymour v. Osborne*, 11 Wall. 516, 546 (1871) (a patent may be "so interspersed with technical terms and terms of art that the testimony of scientific witnesses is indispensable to a correct understanding of its meaning"). In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the "evidentiary underpinnings" of claim construction that we discussed in *Markman*, and this subsidiary fact finding must be reviewed for clear error on appeal.

Teva Pharm. USA, Inc. v. Sandoz, Inc., 135 S. Ct. 831, 841 (2015).

A. Departing from the Ordinary Meaning of a Claim Term

There are "only two exceptions to [the] general rule" that claim terms are construed according to their plain and ordinary meaning: "1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution."[1] *Golden Bridge Tech., Inc. v. Apple Inc.*, 758 F.3d 1362, 1365 (Fed. Cir. 2014) (quoting *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)); *see also GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) ("[T]he specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal."). The standards for finding lexicography or disavowal are "exacting." *GE Lighting Solutions*, 750 F.3d at 1309.

[1] Some cases have characterized other principles of claim construction as "exceptions" to the general rule, such as the statutory requirement that a means-plus-function term is construed to cover the corresponding structure disclosed in the specification. *See, e.g., CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1367 (Fed. Cir. 2002).

To act as his own lexicographer, the patentee must "clearly set forth a definition of the disputed claim term," and "clearly express an intent to define the term." *Id.* (quoting *Thorner*, 669 F.3d at 1365); *see also Renishaw*, 158 F.3d at 1249. The patentee's lexicography must appear "with reasonable clarity, deliberateness, and precision." *Renishaw*, 158 F.3d at 1249.

To disavow or disclaim the full scope of a claim term, the patentee's statements in the specification or prosecution history must amount to a "clear and unmistakable" surrender. *Cordis Corp. v. Boston Sci. Corp.*, 561 F.3d 1319, 1329 (Fed. Cir. 2009); *see also Thorner*, 669 F.3d at 1366 ("The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope."). "Where an applicant's statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable." *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

B. Functional Claiming and 35 U.S.C. § 112, ¶ 6 (pre-AIA) / § 112(f) (AIA)

A patent claim may be expressed using functional language. *See* 35 U.S.C. § 112, ¶ 6; *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347–49 & n.3 (Fed. Cir. 2015) (en banc in relevant portion). Section 112, Paragraph 6, provides that a structure may be claimed as a "means . . . for performing a specified function" and that an act may be claimed as a "step for performing a specified function." *Masco Corp. v. United States*, 303 F.3d 1316, 1326 (Fed. Cir. 2002).

But § 112, ¶ 6 does not apply to all functional claim language. There is a rebuttable presumption that § 112, ¶ 6 applies when the claim language includes "means" or "step for" terms, and that it does not apply in the absence of those terms. *Masco Corp.*, 303 F.3d at 1326; *Williamson*, 792 F.3d at 1348. The presumption stands or falls according to whether one of ordinary skill in the art would understand the claim with the functional language, in the context of

the entire specification, to denote sufficiently definite structure or acts for performing the function. *See Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1372 (Fed. Cir. 2015) (§ 112, ¶ 6 does not apply when "the claim language, read in light of the specification, recites sufficiently definite structure" (quotation marks omitted) (citing *Williamson*, 792 F.3d at 1349; *Robert Bosch, LLC v. Snap-On Inc.*, 769 F.3d 1094, 1099 (Fed. Cir. 2014))); *Williamson*, 792 F.3d at 1349 (§ 112, ¶ 6 does not apply when "the words of the claim are understood by persons of ordinary skill in the art to have sufficiently definite meaning as the name for structure"); *Masco Corp.*, 303 F.3d at 1326 (§ 112, ¶ 6 does not apply when the claim includes an "act" corresponding to "how the function is performed"); *Personalized Media Communications, L.L.C. v. International Trade Commission*, 161 F.3d 696, 704 (Fed. Cir. 1998) (§ 112, ¶ 6 does not apply when the claim includes "sufficient structure, material, or acts within the claim itself to perform entirely the recited function . . . even if the claim uses the term 'means.'" (quotation marks and citation omitted)).

When it applies, § 112, ¶ 6 limits the scope of the functional term "to only the structure, materials, or acts described in the specification as corresponding to the claimed function and equivalents thereof." *Williamson*, 792 F.3d at 1347. Construing a means-plus-function limitation involves multiple steps. "The first step . . . is a determination of the function of the means-plus-function limitation." *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1311 (Fed. Cir. 2001). "[T]he next step is to determine the corresponding structure disclosed in the specification and equivalents thereof." *Id*. A "structure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim." *Id*. The focus of the "corresponding structure" inquiry is not merely whether a structure is capable of performing the recited function, but rather whether the corresponding structure is "clearly linked or associated with the [recited] function."

Id. The corresponding structure "must include all structure that actually performs the recited function." *Default Proof Credit Card Sys. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1298 (Fed. Cir. 2005). However, § 112 does not permit "incorporation of structure from the written description beyond that necessary to perform the claimed function." *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999).

For § 112, ¶ 6 limitations implemented by a programmed general purpose computer or microprocessor, the corresponding structure described in the patent specification must include an algorithm for performing the function. *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999). The corresponding structure is not a general purpose computer but rather the special purpose computer programmed to perform the disclosed algorithm. *Aristocrat Techs. Austl. Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008).

C. Definiteness Under 35 U.S.C. § 112, ¶ 2 (pre-AIA) / § 112(b) (AIA)

Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112, ¶ 2. A claim, when viewed in light of the intrinsic evidence, must "inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). If it does not, the claim fails § 112, ¶ 2 and is therefore invalid as indefinite. *Id.* at 2124. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application for the patent was filed. *Id.* at 2130. As it is a challenge to the validity of a patent, the failure of any claim in suit to comply with § 112 must be shown by clear and convincing evidence. *Id.* at 2130 n.10. "[I]ndefiniteness is a question of law and in effect part of claim construction." *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012).

When a term of degree is used in a claim, "the court must determine whether the patent provides some standard for measuring that degree." *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783

F.3d 1374, 1378 (Fed. Cir. 2015) (quotation marks omitted). Likewise, when a subjective term is used in a claim, "the court must determine whether the patent's specification supplies some standard for measuring the scope of the [term]." *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1351 (Fed. Cir. 2005); *accord Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014) (citing *Datamize*, 417 F.3d at 1351).

In the context of a claim governed by 35 U.S.C. § 112, ¶ 6, the claim is invalid as indefinite if the claim fails to disclose adequate corresponding structure to perform the claimed functions. *Williamson*, 792 F.3d at 1351–52. The disclosure is inadequate when one of ordinary skill in the art "would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim." *Id.* at 1352.

AGREED TERMS

Prior to the oral hearing, the parties agreed to the following terms:

Term	Agreed Construction
"incremental redundancy" ('216 Patent claims 12, 13, 19)	"transmission scheme whereby the transmissions are of sets of coded bits from the same digital data block, and where, in the case of retransmissions, previously received sets of coded bits are stored at the receiver to be combined with a subsequently received set of coded bits, which may or may not be identical to a previously transmitted set of coded bits"
"second available gross rate channel" ('216 Patent claim 20)	"second available gross bit rate channel, which may have different available bandwidth from the first available gross bit rate channel"
"transport format" ('284 Patent claims 1, 2, 3, 7, 14, 15, 16, 20, 27, 28, 29)	"transport format, transport block size, payload size, or modulation and coding scheme"
"serially multiplexing first control signals and data signals . . ., wherein the first control signals are placed at a front part of the	"First control signals and data signals are mapped with a sequence in which one is directly after the other, wherein the first

multiplexed signals and the data signals are placed at a rear part of the multiplexed signals" ('833 Patent claim 1)	control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals" *See Optis Cellular Tech. et al. v. Kyocera et al.*, 2:16-cv-0059-JRG-RSP, Dkt. 108 at 30 (E.D. Tex. Feb. 9, 2017) ("Kyocera CC Order").
"mapping" / "mapped" ('833 Patent claims 1, 8)	Plain and ordinary meaning *See* Kyocera CC Order at 26.
"mapping the multiplexed signals to" ('833 Patent claims 1, 8)	"after placing the first control signals and the data signals [in step (a)], mapping the multiplexed signals to" *See* Kyocera CC Order at 26.
"mapping ACK/NACK control signals to" ('833 Patent claim 1)	"after mapping the multiplexed signals [in step (b)], mapping ACK/NACK control signals to" *See* Kyocera CC Order at 26.
"the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix at step (b) from the last row of the specific columns" ('833 Patent claims 1, 8)	"(1) Some of the multiplexed signals, from the last row of the specific columns of the 2-dimensional resource matrix, are skipped and the corresponding ACK/NACK signals are mapped, and (2) the length of the entire information is maintained equally even after the ACK/NACK control signals are inserted" *See* Kyocera CC Order at 36.
"serially multiplexing first control signals and data signals, wherein the first control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals" ('833 Patent claim 8)	"First control signals and data signals are mapped with a sequence in which one is directly after the other, wherein the first control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals" *See* Kyocera CC Order at 30.
"single carrier frequency divisional multiple access (SC-FDMA) and subcarriers for each SC-FDMA symbol"	"single carrier frequency divisional multiple access (SC-FDMA) <u>symbols</u>[2] and subcarriers for each SC-FDMA symbol"

[2] The parties' Joint Chart further states: "Plaintiffs seek correction of this claim language in the '833 patent to add the term 'symbols.' A typographical error inadvertently omitted the term during prosecution.

('833 Patent claim 8)	
"scheduling request triggering event" ('293 Patent claim 1, 12, 20)	"a predefined condition that triggers a scheduling request" *See* Kyocera CC Order at 42.
"data processor" ('293 Patent claim 12)	Plain and ordinary meaning. *See* Kyocera CC Order at 49.
"means for transmitting…to [a/the] base station" ('293 Patent claim 20)	This claim term should be governed by 35 U.S.C. § 112(6) and the parties identify one or more of the following structure(s), act(s), or materials correspond to this claim term: <u>Structure</u>: FIG. 7 (700 incl. "Transceiver" and antenna), col. 9:53-55, and/or equivalents thereof. <u>Function</u>: "transmitting to a/the base station" *See* Kyocera CC Order at 10.
"means for receiving…from the base station" ('293 Patent claim 20)	This claim term should be governed by 35 U.S.C. § 112(6) and the parties identify one or more of the following structure(s), act(s), or materials correspond to this claim term: <u>Structure</u>: FIG. 7 (700 incl. "Transceiver" and antenna), col. 8:23-24, 9:53-55, and/or equivalents thereof. <u>Function</u>: "receiving from the base station" *See* Kyocera CC Order at 11.
"triggering event detection means for determining whether a scheduling request triggering event has occurred" ('293 Patent claim 20)	This claim term should be governed by 35 U.S.C. § 112(6) and the parties identify one or more of the following structure(s), act(s), or materials correspond to this claim term: <u>Structure</u>: a data processor executing software, as described in connection with data processor 706 and software 708 of FIG. 7 and at col. 9:48-53, implementing the algorithm

Plaintiffs submitted supporting case law and facts in the parties Joint Claim Construction and Prehearing Statement. *See* Dkt. 89-1 at 4, n.1. A certificate of correction was issued by the U.S. Patent and Trademark Office on Nov. 7, 2017 correcting the '833 patent, claim 8 to now include the omitted term 'symbols.'" (Dkt. No. 106-1 at 40, n.2.)

	described in FIG. 6b, in FIG. 5 and step 616 of FIG. 6a, and at cols. 6:16-32, 6:36-45, 6:57-7:3, 7:5-14, 7:42-8:2, 8:29-33, 8:41-9:10 <u>Function</u>: "determining whether a scheduling request triggering event has occurred" *See* Kyocera CC Order at 11.
"means for comparing the transmit buffer status information transmitted to the base station with new information concerning the status of the transmit buffer" ('293 Patent claim 21)	This claim term should be governed by 35 U.S.C. § 112(6) and the parties identify one or more of the following structure(s), act(s), or materials correspond to this claim term: <u>Structure</u>: a data processor executing software, as described in connection with data processor 706 and software 708 of FIG. 7 and at col. 9:48-53, implementing the algorithm described in FIG. 5, at cols. 6:16-26, 6:62-66, 7:64-8:2, and the comparison described at 8:57-60 ("comparing information in the buffer status report stored in step 612 to newly generated information reflecting the status of the current state of the transmit buffer") <u>Function</u>: "comparing the transmit buffer status information transmitted to the base station with new information concerning the status of the transmit buffer" *See* Kyocera CC Order at 11-12

"means for determining whether second data that is available for transmission from the mobile terminal to the base station has a higher priority than the first data" ('293 Patent claim 22)	This claim term should be governed by 35 U.S.C. § 112(6) and the parties identify one or more of the following structure(s), act(s), or materials correspond to this claim term: <u>Structure</u>: a data processor executing software, as described in connection with data processor 706 and software 708 of FIG. 7 and at col. 9:48-53, implementing the algorithm described in FIG. 5 and step 658 of FIG. 6b, and at cols. 6:36-45, 6:62-66, 7:61-8:2, 8:55-63 <u>Function</u>: "determining whether second data that is available for transmission from the mobile terminal to the base station has a higher priority than the first data" *See* Kyocera CC Order at 12.
"means for determining whether the amount of time that has elapsed since the first SR was transmitted exceeds a threshold" ('293 Patent claim 23)	This claim term should be governed by 35 U.S.C. § 112(6) and the parties identify one or more of the following structure(s), act(s), or materials correspond to this claim term: <u>Structure</u>: a data processor executing software, as described in connection with data processor 706 and software 708 of FIG. 7 and at col. 9:48-53, implementing the algorithm described in FIG. 5 and step 662 of FIG. 6b, and at cols. 6:36-45, 6:62-66, 7:2-3, 9:7-10 <u>Function</u>: "determining whether the amount of time that has elapsed since the first SR was transmitted exceeds a threshold" *See* Kyocera CC Order at 12.

(Dkt. No. 106-1 at 10-11, 13-14, 23-33, 35-41, 43-54.)

At the oral hearing, the parties agreed to the following terms:

"gross rate channel" ('216 Patent claims 1, 11, 19, 20)	"a channel characterized by the rate at which bits may be transmitted"
"wherein the redundancy version of the protocol data unit is implicit in the transport	"wherein each individual transport format that is represented by a specific bit combination of

format indicating by a corresponding value of the first subset” (’284 Patent claims 3, 16)	the first subset is univocally linked to a respective redundancy version so that no explicit signaling of the redundancy version of the protocol data unit is necessary.”

(Dkt. No. 111 at 69, 101.)

DISPUTED TERMS

1. “variable length code table” [‘238 Patent claim 1]

PanOptis:	Huawei:
“a table for transforming each variable length code into a value that denotes the number of nonzero coefficients in a block”	“a table for transforming each value that denotes the number of non-zero coefficients in a block into a unique variable length code and vice versa”

The parties originally disputed how the uniqueness of variable length codes should be recited. At the oral hearing, PanOptis agreed to the Court’s construction provided below. (Dkt. No. 111 at 13.) At the oral hearing, Huawei generally agreed to the Court’s construction but stated it objected to the lack of inclusion of “and vice versa.” The issue presented relates to whether the variable length code table should be directed to usage from the perspective of a decoder or both a decoder and encoder.

Positions of the Parties

PanOptis contends that variable length codes (VLCs) represent values and vary in length and that the ’238 patent uses multiple VLC tables to enable adaptive coding/decoding of the number of nonzero coefficients. (Dkt. No. 94 at 2.) PanOptis contends that the claim is directed to an apparatus that implements decoding. PanOptis objects to Huawei’s construction as being from the perspective of an encoder (encoding from the number to the code number value to the VLC bits) and then adding “vice-versa.” PanOptis contends that this adds confusion and that its

construction (from the perspective of a decoder) matches the claim and the description of VLC tables as used in a decoder as shown in the patent. (*Id*. (citing ’238 Patent 23:19-23, 27:30-33).)

PanOptis states that Huawei’s expert admits the claim is directed expressly toward the use of a decoder. (Dkt. No. 102 at 1 (citing Dkt. No. 101-3 (Schonfeld Decl.) at ¶62).) PanOptis points to the claim language; the claimed VLC table is selected by “a coefficient number ***decoding*** unit ***configured to decode***” and used by “a variable length *decoding* unit.” PanOptis notes that the claim does not mention a VLC table in an encoder. PanOptis states that while an encoder and decoder must use the same mapping to encode and decode to the same value, the common mapping is not “the same VLC table,” as one table is part of the encoder, and the other table is part of the decoder. (*Id*.)

Huawei contends that both the encoder and decoder are referenced in claim 1. (Dkt. No. 101 at 4 (citing Dkt. No. 101-3 (Schonfeld Decl.) at ¶62).) Huawei contends that the same VLC table that is selected for encoding the current block is used to decode the same block, and the use of “vice versa” is not only correct, but it is consistent with the opinions offered by PanOptis’ expert: “Video decompression or decoding *reverses* the processing steps of video encoding to recreate a displayable video picture.” (*Id*. (quoting Dkt. 94-1 (Richardson Decl.) at ¶20).) Huawei contends that viewed from the decoder, it is understood that Huawei’s construction reads: “a table for transforming a unique variable length code into each value that denotes the number of non-zero coefficients in a block.” (*Id*.)

<u>Analysis</u>

The claim within which the term is found is clearly directed to decoding. The claims recite a “picture decoding unit” which includes “a block decoding unit.” Further, the claims recite “said block decoding unit includes” “a coefficient number decoding unit.” The “coefficient number

decoding unit includes” the term in question, “a selecting unit configured to select a variable length code table,” and also the “variable length decoding unit” that performs the decoding “by using the selected variable length code table.” In context of the claim language itself, it is clear that the variable length code table in question is a table of a decoder. The claim does not recite the table as used by the encoder. The parties agree that the encoding and decoding schemes must use a common mapping scheme, however, as recited in the claim only the decoder structure is claimed. The presence of a variable length code table in the decoder is further supported by the specification, which teaches a variable length code table in the decoder. ’238 Patent Figures 17, 18A, and 19, 21:49-60, 23:15-29, 23:29-24:32, 27:14-30. Here, the table claimed is the table in the decoding unit.

The Court construes “variable length code table” to mean “a table for transforming each variable length code into a value that denotes the number of non-zero coefficients in a block, within a given table each variable length code is unique and maps to one unique value.”

2. **“generated by coding the number of the non-zero coefficients included in the current block” [‘238 Patent claim 1]**

PanOptis:	Huawei:
“generated by transforming the number of non-zero coefficients included in the current block into a variable length code”	“generated by transforming only the number of non-zero coefficients included in the current block into a variable length code”

The parties dispute Huawei’s inclusion of “only” in the construction.

<u>Positions of the Parties</u>

PanOptis contends that in video coding, a number of parameters may be part of a coded stream representing the picture component of video, such as the numbers of the coefficients, the

coefficient values themselves, run lengths, motion vectors or the like, as well as the number of coefficients. (Dkt. No. 94 at 3 (citing Dkt. No. 94-1 (Richardson Decl.) at ¶¶ 50-52).) PanOptis contends the claim has no requirement of "only" and is drafted as a "comprising," and thus, does not exclude additional parameters. (*Id*.)

Huawei points to the surrounding claim language as reciting a "variable length decoding unit" that is configured to perform variable length decoding on a "coded stream" that has been "generated by coding the number of the non-zero coefficients included in the current block." Huawei contends that the '238 Patent confirms that the "variable length decoding unit" (*e.g*., element 1506 in Figure 20C) is configured to decode a specific piece of data output by the encoder, i.e., the coded stream of 1s and 0s that contains the number of non-zero coefficients in the current block. (Dkt. No. 101 at 5 (citing '238 Patent 24:13-32).) Huawei contends that the patent refers to this piece of coded data as the "coefficient number bit stream." (*Id*. (citing '238 Patent Figs. 18A-B, 20A-C, 22A-B, 23A-B, 24A-B, 25).)

Huawei contends that the '238 Patent shows that, in every embodiment, the coefficient number bit stream, which is a VLC received by the "variable length decoding unit," is generated by the encoder using only the total number of non-zero coefficients in the current block. (*Id*.) Huawei contends that the patentee expressly identified encoding the total number of non-zero coefficients in a block into a VLC as a key feature of the invention that improves upon the prior art. (*Id*. (citing '238 Patent 1:18-2:14).)

As to the use of "comprising," Huawei contends the "comprising" language cannot abrogate claim limitations. (Dkt. No. 101 at 6, n. 2.) As to PanOptis' argument that other items may be coded in the bit stream, Huawei contends that PanOptis relies on portions of the '238 Patent that refer to the generic bit stream that is ultimately output from the encoder to the decoder. (*Id* at

6.) Huawei contends that the phrase in dispute, however, concerns a "variable length decoding unit" (itself part of the "coefficient number decoding unit") that is configured to perform only one task: transform the VLC into the number of non-zero coefficients in the current block. (*Id*. (citing Dkt. No. 101-3 (Schonfeld Decl.) at ¶70).) Huawei contends that the variable length decoding unit does not also decode other information that may be contained elsewhere in a generic bit stream (e.g., values of coefficients). (*Id*. (citing Dkt. No. 101-3 (Schonfeld Decl.) at ¶71).) Huawei contends that the patent teaches that other units are responsible for such decoding (e.g., Fig. 17, Coefficient value decoder 1404).

Huawei contends that PanOptis' construction would allow for the use of the number of non-zero coefficients in the current block—and additional, unrelated information—to generate the VLC. At the oral hearing, Huawei emphasized that in the figures of the '238 Patent the coding of the number of non-zero coefficients is only shown to occur in a coder that has only one input, the coefficient number. (Dkt. 111 at 18-27.)

In reply, PanOptis contends that Huawei's expert admits the coding of the total number of non-zero coefficients in a block "uses" not only that value, but also uses the number of non-zero coefficients in blocks on the periphery to select a VLC table for coding. (Dkt. No. 102 at 2 (citing Dkt. No. 101-3 (Schonfeld Decl.) at ¶¶38-41).)

PanOptis contends that the disputed term is nested within the "receiving apparatus" comprising "a picture decoding unit" that "includes a block decoding unit," which further includes "a coefficient number decoding unit configured to decode the coded block data to obtain the number of nonzero coefficients." PanOptis contends that "to obtain the number of non-zero coefficients," claim 1 requires that the "coded stream" was "generated by coding the number of the non-zero coefficients included in the current block." PanOptis contends that this does not

require the exclusion of other coded information from the bit stream provided to the decoder or any of its components. (*Id*.)

Analysis

The parties do not seem to dispute that other data can be coded in the main data stream between the encoder and decoder. Huawei's argument relates to an assertion that the part of the process that codes the number of non-zero coefficients does so by only using the non-zeros in the current block. In effect, Huawei contends that other information cannot be included for the particular portion of the coding recited: "coding the number of the non-zero coefficients included in the current block." Huawei argues that in this context, Huawei's construction can be read to not limit the coding of other data in the stream provided between the encoder and decoder.

However, Huawei's arguments fail for two reasons. First, even if Huawei's embodiment did not exclude the disclosed coding process, Huawei has not pointed to clear language in the intrinsic record of lexicography, disavowal, or disclaimer mandating the "only" limitation of Huawei's proposed construction. *See GE Lighting Solutions*, 750 F.3d at 1309; *Cordis Corp.*, 561 F.3d at 1329. Rather, Huawei merely points to an embodiment of the specification. However, even a single embodiment is not necessarily enough to read a limitation into the claim from the specification. *Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1254 (Fed. Cir. 2011) ("[E]ven where a patent describes only a single embodiment, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words of expressions of manifest exclusion or restriction."). For this reason alone, Huawei's arguments fail and the Court explicitly rejects inclusion of "only" in the construction.

Second, as noted by PanOptis, in the '238 Patent the particular coding recited in the claim includes more than merely transforming "only" the number of non-zero coefficients in the current

block. Huawei's own expert, and the specification, makes clear that the process includes using the number of non-zero coefficients in the surrounding blocks to make a prediction and then using the prediction to select the particular VLC table that is used for the current block. Further, a coefficient value is encoded in the coded bit stream. (Dkt. No. 101-3 (Schonfeld Decl.) at ¶¶38-41); '238 Patent Figure 1, 9:42-50, 10:4-7, 11:48-50, 15:11-28, Figure 4A, Figure 5. Huawei's construction, which requires "only," can be read to exclude the disclosed coding embodiment. A construction that excludes embodiments is rarely correct. *See Accent Packaging, Inc. v. Leggett & Platt, Inc.*, 707 F.3d 1318, 1326 (Fed. Cir. 2013) (holding that a construction that excludes the preferred embodiment "is rarely, if ever, correct."). Huawei contends that the "coded stream" in question must be a data stream at the location that includes only the encoded coefficient number (the output of block 111 of Figure 1). However the "coded stream" is not claimed to require such a limitation. But rather, as claimed, the coded stream merely must be generated by coding the number of non-zero coefficients included in the current block. This could include the coded stream at the point at which the coded stream includes the other information, including prediction and value information, because the claimed stream is not limited to only containing the number of non-zero coefficients.

The Court construes "generated by coding the number of the non-zero coefficients included in the current block" to mean "generated by transforming the number of non-zero coefficients included in the current block into a variable length code."

3. "ordering vector" ['216 Patent claims 1, 2, 3, 11, 14, 19, 21, 34]

PanOptis:	Huawei:
"one or more ordering patterns that together define the reordering of the bits of the mother code word"	"a one-dimensional array of numbers, not implemented in an interleaver"

The parties' arguments raise two issues. First, does the specification mandate a "one-dimensional array" limitation? Second, does the file history mandate the "not implemented in an interleaver" limitation?

Positions of the Parties

PanOptis states that in the prior art, multiple puncturing patterns (all different) would be used separately to puncture separate copies of the mother code word (all the same) to form separate subblocks, each comprising a subset of the mother code word. (Dkt. No. 94 at 7 (citing '216 Patent 6:47-53).) PanOptis characterizes the '216 Patent as describing applying an ordering vector to the (single) mother code word to form a unitary reordered mother code word. PanOptis points to exemplary puncturing "patterns" P1=[100100100100100100 . . . 100], P2=[010010010010010010 . . . 010], and P3=[001001001001001001 . . . 001] "together form" the exemplary ordering vector, 0=[1,4,7,10, . . . ,2,5,8,11, . . . ,3,6,9,12, . . .], and this ordering vector defines the order in which the bits forming the reordered mother code word are to be modulated and forwarded to the receiver. (*Id* (citing '216 Patent 7:1-10).) PanOptis contends its construction conforms to such usage. PanOptis further contends that one skilled in the art would not limit the term to "one-dimensional" in light of the specification. (*Id*. at 9-10 (citing Dkt. No. 94-2 (Haimovich Decl.) at ¶¶ 111-20).)

PanOptis contends that the word "interleaver" is not mentioned in the specification or the claims. PanOptis contends that the patentee's Nov. 5, 2002, Office Action Response, relied on by Huawei does not contain a clear disclaimer. PanOptis contends that the patentee's remarks refer to an "interleaver" with respect to the Li reference. (Dkt. No. 94 at 7-8 (citing Dkt. No. 94-2 p. 158 of 193 (File History Excerpts) at pp. 8-12).) PanOptis states that the patentee amended the pending claims by adding the "wherein the reordered mother code word is generated based on an ordering vector, the ordering vector defining an order in which bits forming the reordered mother code word

are to be modulated and forwarded to a receiver" limitation. *Id*. PanOptis states that the patentee argued that Li fails to teach "a reordered mother code word that is generated based on an ordering vector . . .," stating, "[i]n contrast, Li's interleaver breaks a correlation of sequential fading coefficients, maximizes the diversity order of the system, and breaks the correlation among sequentially-coded bits and the correlation among the bits associated with the same seven symbols." (*Id*. (citing Dkt. No. 94-2 p. 165-166 of 193 (File History Excerpts) at pp. 8-9).)

PanOptis contends that the patentee did not argue that Li is distinct from the claims, because Li uses an interleaver. PanOptis contends that the patentee explained how Li's particular interleaver and the functions it performs are unrelated to the amended claims' requirement to generate a reordered mother code word. (Dkt. No. 94 at 8.) PanOptis contends that the Li reference can be described as: (i) create a mother code word, (ii) puncture the mother code word with a puncturing pattern to create a subblock, (iii) and then interleave the subblock. PanOptis contends that Li's interleaver, at best, creates reordered subblocks, not a reordered mother code word as required by the amended claims. (*Id*.) PanOptis states that Li is akin to the prior art described in the passage at 6:47-53 of the patent. PanOptis contends that prosecution argument echoes the '216 specification, which contrasts the prior art method of puncturing to create subblocks with the inventive scheme of reordering the whole mother code word. (Dkt. No. 94 at 8-9.)

With respect to the "one-dimensional array" limitation, PanOptis contends that Huawei relies on the "exemplary ordering vector" from the preferred embodiment, which is depicted as a comma-separated list of numbers between square brackets. PanOptis contends that the '216 Patent does not describe the ordering vector as "one-dimensional," nor does it mention dimensionality or "arrays" at all. (Dkt. No. 94 at 9.) PanOptis contends that the word "vector" does not suggest single dimensionality, as a "vector" can have an arbitrary number of dimensions. (*Id*.).

PanOptis further contends Huawei's proposal is inconsistent with the preferred embodiment, where "the mother code word 506 is sequentially punctured using one or more puncturing patterns P1, P2, P3, . . . Pn that together form the ordering vector." PanOptis contends that even assuming that each pattern is one-dimensional, because there are *n* distinct patterns in the preferred embodiment, the resultant ordering vector need not be represented one-dimensionally, for example, in a matrix. (*Id*. at 9-10.)

As to "vector," Huawei contends that its construction tracks how a skilled artisan understands "vector." Huawei notes that as claimed, the ordering vector both reorders the mother code word *and* "defines the order in which the bits of the mother code word are to be modulated and forwarded to a receiver." Huawei contends that the patent only discloses a one-dimensional array of numbers for the ordering vector. Huawei also contends that only a one-dimensional array of numbers can achieve this dual purpose. (Dkt. No. 101 at 8 (citing Dkt. No. 101-1 (Bims Decl.) at ¶¶96-97).). Huawei also contends that technical dictionaries point to a vector being a one-dimensional array of numbers. (*Id*. at 8, n.3.)

As to PanOptis' contention that the "ordering vector" could be, for example, a matrix, Huawei contends that a matrix is a not vector. Huawei also contends that the patent never teaches or suggests a matrix, but even if it did, the claim term is ordering *vector*. Huawei contends that a multi-dimensional array (i.e., a matrix) cannot rearrange a code word and *also* define the order in which those bits are to be modulated and forwarded; it requires more information (e.g., to inform whether bits are sent row-by-row or column-by-column). (Dkt. No. 101 at 11.) Huawei contends that PanOptis is correct that a vector could be multi-dimensional in that a vector's entries can represent multiple dimensions, but the vector itself is still a one-dimensional array (like a line on

a 2D map). Regardless, Huawei contends that the patent does not contemplate or suggest a multi-dimensional vector. (*Id*. (citing Dkt. No. 101-1 (Bims Decl.) at ¶¶110-11).)

With regard to the prosecution history, Huawei contends that the PTO rejected all original independent claims over three references and each reference taught an interleaver, which the PTO found to be a reordering circuit. (*Id.*at 8.) Huawei contends that to overcome this art, the patentees added the "ordering vector" limitation to the reordering circuit and argued that it now distinguished their reordering circuit from interleavers. Huawei contends that to overcome Li, the patentees just quoted Li and argued, without explanation, that what they quoted made Li different. Huawei contends, however, that what the patentee quoted in Li describes "the purpose of bit-by-bit interleaving." Specifically, Huawei compares the statement in the Amendment and Response to the statement in Li:

> Li fails to teach, suggest, or render obvious at least one of the distinguishing features of independent claim 1 as amended. In particular, Li fails to teach, suggest, or render obvious a reordered mother code word that is generated based on an ordering vector, wherein the ordering vector defines an order in which bits forming the reordered mother code word are to be modulated and forwarded to a receiver. In contrast, Li's interlever breaks a correlation of sequential fading coefficients, maximizes the diversity order of the system, and breaks the correlation among sequentially-coded bits and the correlation among the bits associated with the same seven symbols.

(Dkt. No. 101 at 9 (quoting Dkt. No. 101-13 (October 31, 2002 Amendment) at 8) (emphasis added).)

> interleaved bits are grouped into ~~modulation~~ symbols. The purpose of bit-by-bit interleaving is (1) to break the correlation of sequential fading coefficients and to maximize the diversity order of the system [3] and (2) to break the correlation among the sequentially coded bits and the correlation among the bits associated with the same channel symbols.

(*Id.* (quoting Dkt. No. 101-14 (Li) at 625 (emphasis added)).) Huawei contends that this "purpose" is the purpose of an interleaving circuit, it is not the interleaver circuit itself, and it is the purpose of all interleavers. (*Id.*) Huawei contends that when the patentees distinguished Li based on Li's description of the "purpose" of interleaving, a person of ordinary skill understands that the patentees distinguished their claims from all interleavers. (*Id.* (citing Dkt. No. 101-1 (Bims Decl.) at. ¶¶55-56, 80).)

At the oral hearing, Huawei somewhat shifted arguments and emphasized that, at a minimum, the file history serves as a disclaimer to a "bit-by-bit interleaver." (Dkt. No. 111 at 48-50, 57-59.)

In reply with respect to the "one dimensional array of numbers," PanOptis contends that Huawei relies on extrinsic evidence and the preferred embodiment. As to Huawei's argument that a matrix "requires more information" to define the order (express whether the bits are selected across rows or columns), PanOptis contends the one-dimensional array would also need more: the starting point, the gaps in between subsequent sequences, and whether the array should be read left to right or right to left. (Dkt. No. 102 at 3 (citing '216 Patent 9:1-3 ("[A] first subsequence [] taken from a first sequence of bits (e.g., starting from the leftmost value) in the reordered mother code word [] is modulated and transmitted to the receiver"); '216 Patent 7:34-38 ("the second sequence of bits can be adjacent to the first sequence"); and 9:19-22 ("a second sequence of bits

preferably starting from where the first subsequence [] stopped”)).) PanOptis contends that Huawei’s argument regarding matrices raises a distinction without a difference.

As to interleavers, PanOptis contends that the patentee distinguished the “reordered mother code word . . . based on an ordering vector . . .” limitation from three references. PanOptis contends that while the references each have interleavers, at no point did the patentee ever state that simply having an interleaver was a basis for distinction. PanOptis contends that the patentee’s recitation of what Li explains to be the *functions* of Li’s interleaver is not a disclaimer of interleavers as a whole. (Dkt. No. 102 at 4.) PanOptis contends that there is no suggestion that an interleaver used differently could not satisfy the claim limitation. Further, PanOptis contends that Huawei ignores the fact that the patentee did not even mention interleaving while distinguishing Eroz and Kleider on the same limitation. PanOptis contends that a patentee would not disclaim interleavers to traverse a first reference, and then not use that same, universal point to traverse the second and third references, where those references also use interleavers. (*Id*.)

PanOptis contends that Huawei (1) refers to the alleged purpose of Li’s interleaver, (2) argues that the purpose of Li’s interleaver is the same as the purpose of every interleaver, and (3) reasons that since the patentee distinguished away from Li’s interleaver, it must have disclaimed all interleavers. PanOptis contends this is a flawed argument, as interleavers are broadly understood to shuffle bits, and they can be used in a host of different ways and for a host of different purposes based on where in a system’s data flow they are used. (*Id*. at 4-5 (citing Dkt. No. 94-2 (Haimovich Decl.) at ¶¶86-93).). PanOptis contends that Li’s interleaver serves the purposes explained in the file history because of where it exists in Li’s system, namely, downstream from where Li creates subblocks through puncturing. PanOptis contends that Li’s interleaver does not create a reordered mother code word.

Analysis

As to "one-dimensional," Huawei does not point to intrinsic evidence that mandates inclusion of the limitation in the term "ordering vector." The patent does not recite "one-dimensional" or make references to dimensions at all. What the patent does teach is that in the disclosed embodiment, the "ordering vector" is comprised of the combination of multiple patterns. Whether those patterns must be combined in a long series to form a single one-dimensional array or combined in a multi-dimensional array is not described. Specifically, the patent does teach:

> "In the preferred embodiment of the present invention, the mother code word 506 is sequentially punctured using one or more puncturing patterns P1, P2, P3 . . . Pn ***that together form the ordering vector.*** An exemplary ordering vector is given below:
> 0=[1,4,7,10, . . . ,2,5,8,11, . . . ,3,6,9,12, . . .]

'216 Patent 7:1-6. Further, the example puncturing patterns in bit form are described as:

> Exemplary puncturing patterns P1, P2 and P3 are given below:
> P1=[100100100100100100 . . . 100]
> P2=[010010010010010010 . . . 010]
> P3=[001001001001001001 . . . 001]

Id. at 6:53-57. Huawei would have these bits be combined to "together form the ordering vector" in a one dimensional array. To rebut PanOptis' assertion that the data could be combined in a multi-dimensional array, Huawei contends that additional information would be needed to apply the vector (such as row and column information), and thus a multi-dimensional array cannot be used. That argument conflicts with the specification that teaches additional information beyond the bit listing is needed, such as whether bits of each pattern are read left to right, how and where each pattern is placed, and where one pattern stops and one begins. *Id*. at 9:1-3, 7:34-38, 9:19-22. At the oral hearing, Huawei acknowledged that nothing in the specification states that the "ordered vector" cannot be an array. (Dkt. No. 111 at 36.)

As to the extrinsic evidence (dictionaries and experts), the Court finds that, at most, the evidence is conflicting. Even Huawei's own dictionary citations recite a broad meaning beyond one-dimensional. For example, one definition Huawei cites to includes "a set of numbers in an order that has meaning when each position is mapped to a corresponding dimension" (Dkt. No. 101-18 at 520.) This definition does not mention "one-dimensional" and comes from a telecommunications dictionary, as opposed to Huawei's other general dictionary and computing dictionary. (*Id*.) Another of Huawei's definitions also includes "an ordered set of two or more numbers." (Dkt. No. 101-19 at 2.) In light of the specification's more general description that the multiple patterns of bits (puncturing patterns) may merely "together form the ordering vector" ('216 Patent 7:1-6), the Court declines to limit the "reordering vector" to only one-dimensional arrays of data.

As to the prosecution history regarding interleavers, the Court finds PanOptis' arguments better supported. "Because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Phillips*, 415 F.3d at 1317. Here, the prosecution history does not provide clear support to exclude all interleavers from the claim. If anything, the prosecution stands for the proposition that all interleavers were not excluded. With regard to Li, "interleaver" was not mentioned. Rather, merely what Li stated to be the purpose of the bit-by-bit interleaving as characterized and used by Li was referenced by the patentees. There is no mention that the concept disclosed by Li applies to all interleavers or even applies to all bit-by-bit interleavers. It is the "actual arguments made" that provide disclaimer. *Tech. Props. LLC v. Huawei Techs. Co*., Ltd., 849 F.3d 1349, 1359 (Fed. Cir. 2017). Here, "interleavers," "bit-by-bit interleavers" or interleaving in general was not stated to be the point of

distinction. (*See* Dkt. No. 101-13 (October 31, 2002 Amendment) at 8-9.) The prosecution statement does not support the position that all interleavers or all bit-by-bit interleavers were disclaimed. Though the parties dispute whether the stated purpose in Li would apply to every conceivable interleaver or bit-by-bit interleaver, as opposed to the particular implementation of Li, that is the very reason prosecution history may "lack the clarity" to limit the claims. Moreover, as both parties admit, all three references included the use of interleavers. However, "interleaver" (and the interleaver "purpose" argued by Huawei) was not mentioned with regard to the other two references. (Dkt. No. 101-13 (October 31, 2002 Amendment) at 8-12.) This further counsels against the position that the Amendment disclaimed all interleavers in general.

The Court construes "ordering vector" to mean "one or more ordering patterns that together define the reordering of the bits of the mother code word."

4. "reordering circuit for reordering…and generating" ['216 Patent claims 1, 11, 34]

PanOptis:	Huawei:
No construction necessary.	"a circuit for reordering a sequence of bits without interleaving the sequence … and generating" OR "a circuit for reordering, without using an interleaver, the bits of … and generating"

The parties dispute whether Huawei's original use of "sequence of bits" causes confusion and whether "without using an interleaver" is proper (presenting the same dispute as addressed in "ordering vector").

<u>Positions of the Parties</u>

PanOptis contends that Huawei introduces the term "sequence of bits" in a way that is likely to lead to jury confusion. PanOptis notes that, in the claims, the reordering circuit reorders

the mother code word to create a reordered mother code word, and then a modulating circuit modulates a "subsequence" that is taken from the reordered mother code word. PanOptis contends that in Huawei's proposed construction, the "*sequence* of bits" is the mother code word before it is reordered, but the claims also recite a "subsequence" to be taken from the reordered mother code word. PanOptis contends that "subsequence" would imply a portion of the sequence (pre-reordered) mother code word, and thus Huawei's suggestion that the *sequence* exists both before and after reordering injects confusion and inconsistency into otherwise clear claim language. (Dkt. No. 94 at 4-5.)

Huawei contends that, in the alternative, the Court should construe the term as "a circuit for reordering, without using an interleaver, the bits of … and generating," which is substantively identical to Huawei's original proposal and removes the "sequence of bits" issue. (Dkt. No. 101 at 7.) As to its original construction, Huawei states that it does not suggest that the sequence exists both before and after reordering. Huawei states that it recognizes that the "sequence" being reordered is the mother code word and that the result generated by the reordering circuit is a different sequence (the reordered mother code word). (Dkt. No. 101 at 7-8.)

Both parties rely on the arguments presented with regard to "ordering vector" to address the "without an interleaver" language.

Analysis

Huawei has proposed a construction without the use of "sequence." Because both parties propose a construction without the use of "sequence," the Court does not have to address the

question as to whether the use of “sequence” would potentially cause confusion with regard to the subsequently recited “subsequence.”

The only dispute left for the Court to resolve is the inclusion of the phrase “without an interleaver,” a dispute both parties contend should track (or not) the inclusion of that phrase in the “ordering vector” term. The Court has resolved the interleaver issue above with regard to the “ordering vector,” finding that the prosecution history does not support limiting the claims to “without an interleaver.” The Court applies the same rationale to the “reordering circuit” term.

The Court construes the term “reordering circuit for reordering … and generating” to have its plain and ordinary meaning.

5. “puncturing pattern” [‘216 Patent claims 2, 14, 21, 34]

PanOptis:	Huawei:
No construction necessary. Alternatively: “bit selecting pattern used to fully or partially reorder the mother code word”	“pattern of numbers that identifies bits to be preserved and bits to be removed”

The parties dispute whether puncturing patterns “remove” bits.

<u>Position of the Parties</u>

PanOptis contends that Huawei proposes “identif[ying] bits . . . to be removed.” PanOptis contends that this is confusing as the patent makes clear that bits are not “removed” from the mother code word, but rather they are reordered. (Dkt. No. 94 at 10-11.) PanOptis contends that unlike the prior art, where the mother code word is punctured to create subblocks, the patent applies an ordering vector (formed from puncturing patterns in the preferred embodiment) to reorder the entire mother code word. (*Id*. (comparing ’216 Patent Fig. 3 with Fig. 5).).

PanOptis contends that the ’216 Patent discloses puncturing patterns that together form the ordering vector: “[i]n the preferred embodiment . . . , the mother code word 506 is sequentially punctured using one or more puncturing patterns P1, P2, P3 . . . Pn that together form the ordering vector.” ’216 Patent 7:1-7. PanOptis contends that the exemplary puncturing patterns are readily understood and the term is used in accordance with its plain meaning. (Dkt. No. 94 at 11.) PanOptis also contends that Huawei’s argument that the claimed “ordering vector” is “not an individual puncturing pattern” is inconsistent with claim 2, which states that the ordering vector may be “based on at least one puncturing pattern.” (Dkt. No. 102 at 5.)

Huawei contends that the patent states, puncturing patterns are “bitmaps containing ones [bits to keep] and zeros [bits to remove].” ’216 Patent 4:13-17. Huawei contends that the patent discloses three exemplar puncturing patterns. Huawei points to one of them being P1 = [100100100100…]. Huawei contends that applying the first ten slots of P1 to a 10-bit code word will keep the bits in positions 1, 4, 7, and 10 and delete (i.e., “puncture”) the rest. Huawei notes that P1 could also be written as [1,4,7, …] because these numbers are the bit-positions to keep; the number(s) in-between (i.e., 2-3, 5-6, etc.) can be left out because they are the bit-positions to remove. (Dkt. No. 101 at 11.)

Huawei contends that the admitted prior art uses puncturing patterns to keep and remove bits from a mother code word to reduce it (use less bits) to a punctured data block that can fit on a fixed-sized channel. ’216 Patent Figs. 1-3, 1:62-67 (“[T]he coded data block is punctured according to a selected deleting pattern to produce a corresponding punctured data block having erasures.”). Huawei contends that prior art cited on the face of the patent describes puncturing patterns in the same way. (Dkt. No. 101 at 12.)

Huawei contends that the ’216 patent discloses another use for these puncturing patterns, applying multiple prior-art puncturing patterns, one after the other. ’216 Patent 7:1-5 (“[T]he mother code word 506 is sequentially punctured using one or more puncturing patterns ….”). Huawei contends that supplying these puncturing patterns sequentially means that “together” they form an “ordering vector.” Huawei contends that the ordering vector (not an individual puncturing pattern) ensures that no bits are added or removed from the mother code word. (Dkt. No. 101 at 12 (citing ’216 Patent 7:3-5 and Dkt. No. 101-1 (Bims Decl.) ¶¶138-40).) Huawei contends that each individual pattern still defines bits to keep and remove from the mother code word. *Id.* If bits are added or removed, Huawei contends that the result is not a “reordered” mother code word; it is something else—a modified or punctured data block (like in the prior art). (Dkt. No. 101 at 12, n. 6.)

Huawei agrees that bits are not removed from the mother code word, but disagrees that Huawei’s construction is confusing. Huawei states that though the net overall-effect of using sequential puncturing patterns that form an ordering vector is only to reorder bits, when each individual puncturing pattern is applied it defines bits to keep and bits to remove from the code word. *Id*. Huawei contends that this is a puncturing pattern, regardless of how the system joins its result with other puncturing patterns’ results. (Dkt. No. 101 at 12-13.)

Huawei contends that PanOptis’ construction does not track how the patent uses puncturing patterns and just muddies the water. PanOptis contends that a puncturing pattern cannot “fully” reorder a mother code word: it can only remove bits, which PanOptis’ expert agrees is not “reordering.” (*Id.* at 13 (citing Dkt. No. 101-1 (Bims Decl.) at ¶134; Dkt. 94-2 (Haimovich Decl.) at ¶155).) Huawei contends that a puncturing pattern can only “partially reorder the mother code word” by identifying bits to keep and to remove from the code word; the removed bits must be put

back into the final sequence (e.g., via another puncturing pattern that keeps those bits and drops all others) to ensure that no bits are removed; but accounting for those (temporarily) removed bits is not the role of any single puncturing pattern. (*Id.*) Huawei contends that PanOptis' construction is incorrect, because it focuses on a particular use of a collection of puncturing patterns and does not address the meaning of "puncturing pattern," independent of how it is used. Huawei also contends that PanOptis' construction is redundant with other language of the claims that "each of the at least one puncturing patterns being used to reorder the mother code word." '216 Patent claim 2.

Analysis

The specification makes clear that "puncturing pattern" is a term known in the prior art and that the term is used in the specification in the same manner as in the prior art. As described in the Background of the Invention, the prior art techniques applied a single puncturing pattern to a mother code word to create a "punctured data block (subblock)" which has less bits than the mother code word due to deleting bits. '216 Patent Figures 2, 3, 1:62-67, 2:12-3:20. "[T]he coded data block is punctured according to a selected deleting pattern to produce a corresponding punctured data block having erasures." *Id*. at 1:62-64. Further, the specification is clear that the usage of the puncturing pattern is what is different in the current disclosure, not the puncturing pattern concept itself. Specifically, the specification discloses multiple puncturing patterns may be used together to reorder a mother code word to form an ordering vector. The ordering vector includes all the bits of the mother code word, just reordered. Although individual puncturing patterns remove bits, the usage of multiple puncturing patterns together, provides all the bits. This is described:

> For example, different puncturing patterns P1, P2, P3 . . . Pn may be used in sequence to reorder and form the reordered mother code word 508. Whereas, in the prior art different puncturing patterns P1, P2 . . . Pn (all different) would be used separately to puncture each mother code word 306 (all the same) and form different

> subblocks 308a, 308b . . . 308n (see FIG. 3). Exemplary puncturing patterns P1, P2 and P3 are given below:
> P1=[100100100100100100 . . . 100]
> P2=[010010010010010010 . . . 010]
> P3=[001001001001001001 . . . 001]
> In the prior art, the subblock 308a would contain the bits in positions 1,4,7,10, . . . of the mother code word 306, since the puncturing pattern P1 has ones in these positions. Similarly, the subblock 308b would contain the bits in positions 2,5,8,11, . . . of the mother code word 306, and the subblock 308c (not shown) would contain the bits in positions 3,6,9,12 . . . of the mother code word 306. These subblocks 308a, 308b and 308c are sequentially sent to the receiver 120 until the receiver successfully decodes the digital data block 304.
>
> In the preferred embodiment of the present invention, the mother code word 506 is sequentially punctured using one or more puncturing patterns P1, P2, P3 . . . Pn that together form the ordering vector. An exemplary ordering vector is given below:
>
> 0=[1,4,7,10, . . . ,2,5,8,11, . . . ,3,6,9,12, . . .]

’216 Patent 6:47-7:6. This usage of “puncturing pattern” also conforms to the usage in the cited prior art and also conforms to both experts’ understanding of the term as used in the prior art. (*See* Dkt. No. 101-1 (Bims Decl.) at ¶¶ 132-134; Dkt. No. 94-2 (Haimovich Decl) at ¶¶ 88, 106, 108.) The Court finds that the extrinsic evidence is clear as to the meaning in the art of “puncturing pattern” and that it conforms to the usage in the specification described above.

PanOptis contends that it would be confusing to define “puncturing patterns” as “removing” data. However, it is clear that, as known in the art and also as used in the specification, that is exactly what puncturing patterns do. That the patent describes using a technique to apply multiple puncturing patterns to the mother code word and then combine the results to form a reordered word that includes all the bits, does not change the meaning of an individual puncturing pattern. At the oral hearing, PanOptis agreed to a construction as adopted below if the Court changed “preserved” to “selected” and changed “removed” to “ignore.” The Court declines to adopt such changes so as to stay more true to the intrinsic record as each individual puncturing

pattern preserves and removes bits, again the combination of multiple puncturing patterns providing all the bits.

The Court construes "puncturing pattern" to mean "pattern of numbers that identifies bits to be preserved and bits to be removed."

6. "fixed net rate channel" ['216 Patent claim 34]

PanOptis:	Huawei:
"fixed net bit rate channel" Alternatively: "channel characterized by a fixed number of net bits transmitted in a given time period." (Dkt. No. 94 at 14)	Indefinite.

The parties dispute whether a term absent from the specification, "net rate," renders the claim indefinite.

<u>Positions of the Parties</u>

PanOptis contends that the claim itself provides context by referring to a "digital data block" that is coded to create a coded mother code word. PanOptis contends that one of ordinary skill would understand that, in the claim's context, the net rate is the effective transmission rate of those digital data bits. (Dkt. No. 102 at 6 (citing Dkt. No. 94-2 (Haimovich Decl.) at ¶149).) PanOptis contends that the relevant claim language maps directly to a single paragraph in the specification, at '216 Patent 9:60-10:11, discussing "quality of service requirements" and "desired" "code rate." PanOptis contends that this embodiment involves determining a "suitable code rate" and then selecting "as many bits as is needed to obtain the subsequence corresponding to that rate" for transmission on the channel. (Dkt. No. 94 at 13 (citing '216 Patent 9:60-10:11).) PanOptis contends that one of ordinary skill in the art would understand that the "net bit rate" of

the claim term refers to selecting a bit sequence that corresponds to a code rate, and that the channel is "fixed" in the sense that the desired "net bit rate" is unchanging over time. (*Id*. at 13-14 (citing Dkt. No. 94-2 (Haimovich Decl.) at ¶¶149-50).)

As to the passage at 9:60-10:11, PanOptis contends that the claim maps to this paragraph. PanOptis contends that the claim's unique elements, including "quality of service requirements," and "as many bits as [is] needed" to obtain a "desired" or "wanted code rate," are described in the specification only within this particular passage. (Dkt. No. 102 at 6.) As to the relevant disclosure mentioning only "variable rate," PanOptis contends that the patent describes two solutions within a variable *gross* rate channel: (i) where the desired code rate stays the "same" (i.e., is fixed), or (ii) where it changes. (*Id*. (citing '216 Patent at 10:3-8 ("the same number of bits if the same code rate is desired," or "more or fewer bits if not, are . . . transmitted.")).) PanOptis contends that the specification thus discloses the claimed scenario where the same number of *net* digital data bits are transmitted each time, i.e., where the net rate channel is fixed.

Huawei contends that unlike the gross rate, a net rate depends on context. Huawei contends that a "net rate" is generally the rate at which "useful" bits are transmitted. (Dkt. No. 101 at 14 (citing PanOptis expert, Dkt. 94-2 (Haimovich Decl.) at ¶150 ("'[N]et' bitrate is commonly understood to in the art as referring to the rate at which information bits, or useful bits, are transmitted.")).) Huawei contends that what is "useful" depends on the context.

Huawei notes that wireless systems use a layered protocol design. (Dkt. No. 94 at 14-15 (citing Dkt. No. 101-1 (Bims Decl.) at ¶124).) Huawei's expert contends that one common layer, the transport layer, manages retransmissions. (Dkt. No. 101-4 (Bims Decl.) at ¶125.) He states that to calculate the net rate of this layer, one must account for retransmissions (e.g., if the same data is sent twice, the net rate is roughly halved). (*Id.* at ¶125.) Further, he states that different layers

typically have different net rates. (*Id.* at ¶126.) Huawei contends that PanOptis' expert agrees that a "net rate" is context-dependent: he explains that calculating the "net" bit rate should "exclude[], for example, certain types of overhead bits." (Dkt. No. 101 at 15 (quoting Dkt. 94-2 (Haimovich Decl.) at ¶150).) Huawei's expert states that overhead bits are not fixed within or across layers; instead, they depend, for example, on the layer being considered. (*Id.* (citing Dkt. No. 101-1 (Bims Decl.) at ¶125).)

Huawei contends that claim 34, the specification, and the prosecution history do not explain the baseline (context) for the "net rate" and do not mention "net rate," other than in the claim. (Dkt. No. 101 at 15.) Huawei further notes that though the patent refers to a "fixed rate channel" in the prior art, 1:44-52, a "fixed rate" is not a "fixed *net* rate." (*Id*. (citing Dkt. No. 101-1 (Bims Decl.) at ¶128 (explaining that there can be a "fixed *gross* rate" or a "fixed *net* rate")).)

As to PanOptis' citation of '216 Patent 9:60-10:11, Huawei notes that this passage does not recite "fixed." Huawei states that instead, these lines describe "variable rate," not fixed rate, channels. '216 Patent 9:60-64. Further, Huawei states that this passage contains no mention of a "net rate."

In reply to Huawei's arguments regarding network layers, PanOptis acknowledges that net rates can differ between layers, but states that, here, the patent is agnostic as to the concept of layers. (Dkt. No. 102 at 6, n. 5.)

<u>Analysis</u>

The specification repeatedly references a "gross rate channel." No mention is made in the specification or prosecution history of a "net rate channel." Further, the concept of "net" is mentioned nowhere in the specification or prosecution history outside of claim 34. PanOptis contends that the term "net" gains context from the claim itself, specifically noting that the claim

calls out “digital data block.” However, the specification is replete with disclosure that what is coded for transmission over a “gross rate channel” is also a digital data block.[3] ’216 Patent Abstract, Figure 4, 5:40-6:67, 7:17-8:11. Further, it is noted that claim 1, which references a “gross rate channel,” uses similar “digital data block” language. PanOptis also contends that the concepts of “wanted”/“desired” and “needed” provide context to “net.” That argument also fails. It is noted that both claim 1 (“gross rate channel”) and claim 34 “fixed net rate channel” include the word “desired” and the concept of a “desired” number of bits to fill the bandwidth of the gross rate channel (claim 1) or the “desired” code rate. Further, PanOptis notes that the passage at 9:43-10:11 includes these concepts. However, there is nothing to indicate that this passage is not directed toward a “gross rate channel.” In fact, in context of the specification as a whole that passage is directed toward a gross rate channel.

As to the claims’ reference to “quality of service,” PanOptis again points to the passage at 9:43-10:11 for supporting such a language. Again, this passage, in the context of the specification as a whole, is directed to a gross rate channel. The usage in the specification of “as many bits as is needed to obtain the subsequence” (’216 Patent 10:1-2) also does not lend support to PanOptis’ arguments. Again, there is nothing to indicate that this passage is not directed toward a gross rate channel. Further, this passage is explicitly directed to channels having variable rates: “schemes on

[3] The parties have agreed that “gross rate channel” is “a channel characterized by the rate at which bits may be transmitted.” (*See* Dkt. No. 111 at 69.)

variable rate, i.e., the transmitter controls the occupied bit rate channels." *Id*. at 9:62-64. However, the term in question is "fixed net rate channel."

As to quality of service requirements identified by PanOptis, it is noted that quality measurements are mentioned in context of the prior art. *Id*. at 2:17. In context of the specification, such reference applies to gross rate channels.

Based on the intrinsic evidence, which provides no reference to the "net rate channel" concept, the "fixed net rate channel" term is indefinite as to the meaning of a "net rate channel." The extrinsic evidence also supports such a conclusion. The parties cite to competing expert reports as to such issue. The Court also finds that Huawei's expert's opinions are more supported by the intrinsic record and more plausible in light of the evidence as a whole. The competing extrinsic evidence of those skilled in the art better supports Huawei's position that the term "net rate channel" does not have definite meaning to those in the art in light of the '216 Patent specification. *See Teva Pharm. USA*, 135 S. Ct. at 841 (2015) (allowing courts to make subsidiary factual findings about the extrinsic evidence).

The Court finds that the term "fixed net rate channel" is indefinite.

7. "transmit/transmitting the first absolute CQI value and the relative CQI value of the second absolute CQI value in the same block" ['851 Patent claims 1, 5]

PanOptis:	Huawei:
"transmit/transmitting the absolute CQI value for a block for the first data and the relative CQI value for the same block for the second data"	"transmit/transmitting the absolute CQI value calculated for each block of the first data plurality of blocks and the relative CQI value calculated for each block of the second data plurality of blocks"

The parties dispute whether the transmitting has to be "for each block."

Positions of the Parties

PanOptis contends that the patentee claimed (in claim 1 for example) a calculating unit configured to calculate CQI values "per each of the blocks" of the two data streams. But, the patentee then claimed a transmitting unit configured to transmit "the first absolute CQI value and the relative CQI value of the second absolute CQI value in the same block." PanOptis contends that the patentee plainly chose not to claim transmitting "per each of the blocks." (Dkt. No. 94 at 16-17.) PanOptis contends that Huawei's construction would limit the claims to embodiment 2 of the specification. (*Id*. at 16-17, n.7.)

PanOptis contends that the patent describes various embodiments and that Huawei's construction conflicts with some of the embodiments. PanOptis contends that the patent's various embodiments describe feeding back CQI information in a variety of different ways, including certain embodiments that describe that CQI feedback is reported as a single value per data stream—i.e., "CQI of the reference substream alone is given in an absolute value and the CQIs of the other substreams are given in relative CQI values." (*Id*. at 17 (quoting '851 Patent 6:10-16).) Huawei contends that reading each block would cut against the patent's stated aim, which is to "reduce the amount of feedback information and system traffic." (*Id*. (quoting '851 Patent 2:22-25).)

PanOptis also contends that the patentee amended the transmitting limitation "to specifically recite that 'the first CQI value' for the first data is an absolute value and is not a relative value." (*Id*. at 17 (citing Dkt. No. 94-2, Ex. B-4, p. 179 of 193 (File History Response) at p. 9).) PanOptis contends that the patentee thus confirmed the claim covers transmitting a single (absolute) CQI value for the first data and a single (relative) CQI value for the second data. (*Id*. at 17.)

Huawei contends that the ’851 Patent describes a narrowband technique (embodiment 2) that transmits an absolute/relative CQI value pair for ***each subcarrier block*** for frequency scheduling purposes. Huawei also contends that the patent describes the wideband CQI techniques discussed in the patent transmit ***only one*** absolute/relative CQI value pair for each data stream to the MIMO transmitting apparatus to reduce the amount of transmitted data. Huawei contends that the narrowband techniques are better, because they provide all the information required for frequency scheduling but at the cost of transmitting more CQI data. (Dkt. No. 101 at 16.)

Huawei contends that the narrowband CQI technique (embodiment 2) is the *only* embodiment discussed in the prosecution history and the only technique that is captured by claims 1 and 5 of the patent. Huawei contends that its construction aligns the claims with the narrowband techniques described in embodiment 2 that calculate and transmit CQI data for each block. (Dkt. No. 101 at 16-17.)

Huawei contends that in both independent claims, the “calculating” limitations require that the absolute/relative CQI value pairs are calculated for ***each subcarrier block*** of a plurality of subcarrier blocks in the frequency domain. Huawei contends that though they are calculated for each subcarrier block, the claims refer to them as first absolute CQI value and relative CQI value. Huawei contends that, thus, the “transmit unit/transmitting” limitations would require that all the subcarrier block pairs, subsequent to the calculation process, be transmitted back to the transmitting apparatus. (Dkt. No. 101 at 17.)

Huawei states that when summarizing the claims at issue to the Examiner in response to a rejection, the patentee explained that the claims require calculating absolute/relative CQI value pairs on a “per each of the blocks” and transmitting the block pairs:

> [T]he subject matter of claims 11 and 18, which recite “calculat[ing] a first absolute CQI value per each of the blocks for the first data and a second absolute CQI value

> per each of the blocks for the second data, and calculat[ing] a relative value of the second absolute CQI value with respect to the first absolute CQI value, *per each of the blocks*, from the first absolute CQI value and the second absolute CQI value *in the same block*," "transmit[ting] the first absolute CQI value and the relative value of the second absolute CQI value *in the same block*,

(Dkt. No. 101-9 at 8 (*emphases* in original).)

Huawei further contends that the subsequent "wherein" limitations of claims 1 and 5 also support Huawei's proposal. Huawei contends that the "wherein the relative CQI value…" clause, which was added for reasons of patentability, minimally requires that the transmission of CQI values includes at least the first and second absolute/relative CQI block pairs. (Dkt. No. 101 at 17-18.) Huawei contends that PanOptis never addresses the effect of the "wherein" clause on the "transmit unit/transmitting" limitations of claims 1 and 5. Huawei contends that PanOptis ignores the language of claims 1 and 5, both of which comport with only a single technique disclosed in the specification. Further, Huawei contends that PanOptis' expert further ignores that all the narrowband CQI techniques of the '851 patent transmit of all the absolute/relative CQI block pairs in the "plurality of blocks" back to the transmitting apparatus. (*Id*. at 18-19.)

Huawei contends that PanOptis' expert admits to mixing the disclosures from *different* embodiments that operate in different ways to support his claim construction argument. (*Id*. at 18 (citing Dkt. 94-2 (Haimovich Decl.) at ¶211).) Huawei contends that PanOptis is using a non-existent embodiment to contradict the plain language of the claims. (*Id*.)

Huawei contends that PanOptis' proposed construction renders the "transmit unit/transmitting" limitations indefinite because it is ambiguous as to *which* absolute/relative CQI value pair of the frequency domain is transmitted: the third CQI value pair, the penultimate pair, etc.? Huawei contends that its proposed construction eliminates this ambiguity. (*Id*.)

As to the file history, PanOptis contends that the cited passage does nothing more than parrot the claims. PanOptis contends that the patentee explained that the claim covers a unit configured to transmit *an* absolute CQI value for the first data and *a* relative CQI value for the second data. (Dkt. No. 102 at 7.)

As to the "wherein" clause, PanOptis contends that the earlier "calculating unit" clause defines what must be calculated, and the "wherein" clause explains how that calculation is made across the blocks of the first and second data—i.e., taking first block from first block, second block from second block. PanOptis contends that, contrary to Huawei's argument, the "wherein" clause does not require transmitting two or more pairs of data. PanOptis contends that it is easy to calculate multiple pairs of values and transmit only a single pair, and the patent claims just that. (*Id*.) PanOptis states that one of ordinary skill in the art would understand that the claim's transmitting unit is configured to transmit pairs of data—i.e., where the absolute value for the first block of the first data is to be transmitted, the relative value for the first block of the second data is transmitted; where the absolute value for the second block of the first data is to be transmitted, the relative value for the second block of the second data is transmitted. (*Id*.)

Analysis

At the oral hearing, PanOptis emphasized that "the first" merely references "the first data" and "the second" merely references "the second data" and that what is recited in the claim is transmitting one value for all of the data. (Dkt. No. 111 at 77.) PanOptis' argument does not conform to the claim language. The claim language in question is "the first absolute CQI value" and "the second absolute CQI value." At the oral hearing, PanOptis could not rebut that it was ignoring the antecedent basis of "the first…" and "the second…." (*Id*. at 79-83.) The claim does make reference to "first data and second data." However, the claim then recites:

> …calculate ***a first absolute channel quality indicator*** (CQI) value ***per each of the blocks*** for the first data and a second absolute CQI value per each of the blocks for the second data, and calculate ***a relative CQI value*** of the second absolute CQI value with respect to the first absolute CQI value, per each of the blocks, from the first absolute CQI value and the second absolute CQI value in the same block…

’851 Patent claim 1 (emphasis added). The claim then recites the transmitting limitation in question. It is clear from the claim language, that in the transmitting limitation the antecedent for “the first absolute CQI value” is the earlier recited “a first absolute channel quality indicator (CQI) value per each of the blocks” and “the relative CQI value of the second absolute CQI value” is the earlier recited “a relative CQI value of the second absolute CQI value with respect to the first absolute CQI value, per each of the blocks.”

PanOptis, in effect, contends that the use of “the” creates ambiguity and that “the” should be ignored by contending that any absolute value CQI related to the first data and any relative CQI value related to the second data may be transmitted. In support of such argument, PanOptis cites to embodiments in which the absolute CQIs and relative CQIs are not calculated and transmitted on a block by block basis, but rather, as an average of multiple blocks. *See* ’851 Patent Figure 4, 5:65-6:21.[4]

The Court finds that such a reading of the claim language is not reasonable in light of the claim language itself and also in light of the specification. As to the claims (using claim 1 as an example), first, the Court cannot ignore the claims reference to “***the*** first absolute CQI value” and “***the*** relative CQI value.” Second, the transmitting limitation further emphasizes the block by block nature of the claim by stated that “the” values are transmitted “in the same block.” PanOptis would

[4] Though the Court disagrees with PanOptis’ interpretation of the claim in light of the actual claim language and the specification, to the extent PanOptis seeks to change the use of “the” as an antecedent, such a correction to the claim would be subject to reasonable debate. Such corrections cannot be made by the Court as a Court can only correct an error if it “is not subject to reasonable debate.” *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003)

ignore that the transmitting step of "the" values (which earlier in the claim are calculated for "each block") are explicitly recited to be transmitted "in the same block" as opposed to some average value for multiple blocks. "***The*** same block" appears to clearly refer to usage of "***the*** same block" in the calculating step in which the calculations are performed "per each of the blocks." Though, "***the*** same block" in the calculating step also lacks an antecedent basis, a most natural reading of "same blocks" in the calculating step is as a reference to the claimed "per each of the blocks" of the calculating limitation. Third, the subsequent "wherein" clause provides further details of the calculating process. This limitation further emphasizes a block by block process by describing calculating the relative CQI value in the first block with respect to the first CQI absolute value, and calculating the relative CQI second value in the second block with respect to the first absolute value CQI of the second block. Fourth, the wherein clause again uses the same "***the*** absolute CQI value" antecedence and "***the*** relative CQI value" antecedence in usage where the claim is clearly referencing a per block connotation.

The specification also conforms to Huawei's construction. Huawei is correct in that PanOptis, in effect, mixes features of various embodiments. PanOptis contends that the patent discloses CQI feedback that is reported as a single value per data stream, citing to the embodiment of Figure 4 and its description at 6:10-16. However, PanOptis has not identified, and the specification does not describe, such embodiment with relation to the "per each block" limitations of the calculating unit claim element, "the same block" of both the calculating element and the transmitting element, and the "first block" and "second block" calculations of the wherein clause. It is clear that as claimed, the claim is directed to the per each block embodiments of the specification.

The Court construes "transmit/transmitting the first absolute CQI value and the relative CQI value of the second absolute CQI value in the same block" to mean "transmit/transmitting the absolute CQI value calculated for each block of the first data plurality of blocks and the relative CQI value calculated for each block of the second data plurality of blocks."

8. **"wherein the relative CQI value of the second absolute CQI value in the first block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the first block of the plurality of blocks for the first data, and the relative CQI value of the second absolute CQI value in the second block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the second block of the plurality of blocks for the first data" ['851 Patent claims 1, 5]**

PanOptis:	**Huawei:**
"wherein the relative CQI for the first block of the plurality of blocks for the second data is calculated as the absolute CQI value for the first block of the plurality of blocks for the first data minus the absolute CQI value for the first block of the plurality of blocks for the second data, and the relative CQI for the second block of the plurality of blocks for the second data is calculated as the absolute CQI value for the second block of the plurality of blocks for the first data minus the absolute CQI value for the second block of the plurality of blocks for the second data."	"The relative CQI of the initial block in the plurality of second data blocks is calculated based on the absolute CQI of the initial block in the plurality of first data blocks, and the relative CQI of the next block in the plurality of second data blocks is calculated based on the absolute CQI of the next block in the plurality of first data blocks"

Two issues are presented. First, is the "first block of the plurality of blocks" the first block in time, or just a more general identification of the "first" block and the "second" block of the plurality of blocks? Second, the parties dispute PanOptis' requirement that the calculation be a subtraction ("minus") calculation.

Positions of the Parties

PanOptis contends that this term defines the claims' relative value calculation. PanOptis contends that "initial" is not used in the claims or the specification, and is confusing in that it implies a temporal relationship between the blocks that does not exist. (Dkt. No. 94 at 18.) PanOptis also contends that "first/second data blocks" are not found elsewhere in the claims, in any party's construction, or in the specification of the patent. (*Id*.) PanOptis contends that the sub-phrase "first block of the plurality of blocks for the second data" is readily understood and needs no construction.

PanOptis contends that its construction clarifies the claim language to better explain how the claimed relative value calculations are made. PanOptis points to the specification as describing the calculation as examining the CQI values of "the individual chunks" of the various data streams, and calculating the difference "between the CQI value of the reference substream and the CQI values of substreams other than the reference substream." (*Id*. at 18 (citing '851 Patent 8:17-24).) PanOptis contends that this term and the specification both describe reducing feedback information by calculating the difference "between" and "with respect to" the "CQI value of the reference substream and the CQI values of [other] substreams." (Dkt. No. 102 at 8 (citing '851 Patent 8:17-24; 1:47-57, 2:22-25).) PanOptis contends that its proposal captures the patent's "reduc[ing]," (1:47-57, 2:22-25) and clarifies how it occurs—namely, subtracting the second value from the first to find the difference "between" the two values.

PanOptis contends that the reduction in feedback (which is based on the fact that a relative, subtracted, value can be represented by fewer bits than an absolute value) is the core of the invention. (Dkt. No. 94 at 19 (citing '851 Patent 1:47-57, 2:22-25).) PanOptis contends that its proposal captures this reduction in feedback size by explaining that the relative value calculation

is based on a subtraction operation—namely, the absolute CQI value for a block of the plurality of blocks for the first data minus the absolute CQI value for the same block of the plurality of blocks for the second data.

Huawei objects to PanOptis adding the subtraction function into this claim limitation. Huawei contends that the ’851 patent does not explicitly disclose any method for calculating the relative CQI value. (Dkt. No. 101 at 19 (citing Dkt. No. 101-4 (Wells Decl.) at ¶66).) Huawei states that PanOptis’ inclusion of “subtraction” for calculating the relative CQI value is not proper, since no calculation functions for relative CQI values are disclosed in the patent. (*Id*.)

Analysis

Though PanOptis contends that the patent teaches calculating the “difference” (Dkt. No. 102 at 8), the specification citations provided by PanOptis do not explicitly provide for a difference, subtraction or minus calculation in any manner. At the oral hearing, PanOptis acknowledged that it was only relying on the specification’s use of “between.” (*See* Dkt. No. 111 at 88-89.) The patent does describe reducing the amount of feedback information by sending a “relative CQI” value as opposed to the absolute CQI value. *Id*. at 1:47-57, 2:22-25, 7:23-29. Furthermore, the patent describes that the:

> [r]elative value calculating section 350 calculates relative CQI values of the individual chunks (hereinafter may be referred to as "relative chunk CQI values") between the CQI value of the reference substream and the CQI values of substreams other than the reference substream.
>
> .

Id. 8:17-22. This passage provides no limitation, though, on the particular method of calculating the relative value between the reference substream and the other substream. Even if PanOptis’ alleged subtraction embodiment was disclosed, PanOptis has not pointed to clear language in the intrinsic record of lexicography, disavowal, or disclaimer mandating that such an embodiment must be incorporated into the claims. *See GE Lighting Solutions*, 750 F.3d at 1309; *Cordis Corp.*,

561 F.3d at 1329. Rather, PanOptis merely points to an embodiment of the specification. However, even a single embodiment is not necessarily enough to read a limitation into the claim from the specification. *Arlington Indus.*, 632 F.3d at 1254 ("[E]ven where a patent describes only a single embodiment, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words of expressions of manifest exclusion or restriction."). In context of the intrinsic record as a whole, PanOptis has not provided sufficient support to incorporate "minus" into the construction.

As to the use of "initial" by Huawei, PanOptis contends that such a term could imply a temporal meaning. The specification does indicate that the blocks (also called chunks as indicated in the patent at 1:49-52) refer to bundles in the frequency domain: "[h]ere, a "chunk" refers to a bundle of consecutive subcarriers in the frequency domain." '851 Patent 5:50-52. The claims also call out "using a plurality of blocks, into which a plurality of consecutive subcarriers in a frequency domain are divided." '851 Patent claims 1, 5. As drafted, the claims recite "the first block" and "the second block," and merely require the first/second blocks to be the first and second of "the plurality of blocks." Since Huawei has not pointed to any reason to potentially import a temporal limitation into the claims, the Court considers it improper to do so.

The Court construes the term "wherein the relative CQI value of the second absolute CQI value in the first block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the first block of the plurality of blocks for the first data, and the relative CQI value of the second absolute CQI value in the second block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the second block of the plurality of blocks for the first data" to have its plain and ordinary meaning.

9. "wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of values, is reserved for indicating the redundancy version for transmitting the user data" ['284 Patent claims 1, 14]

PanOptis:	Huawei:
No construction necessary. Alternatively: "wherein a first subset of the values is used for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is used for indicating the redundancy version for transmitting the user data"	"wherein a first subset of values is set aside just for transport format values of the protocol data unit and a second subset of the values is set aside just for redundancy version values for transmitting the user data"

The parties dispute whether "reserved for," requires "is set aside just for."

<u>Positions of the Parties</u>

PanOptis contends that "set aside just for" would narrow the claims to exclude virtually every disclosed embodiment. PanOptis contends Huawei's only basis for adding this limitation is dictionary definitions of the word "reserved." PanOptis contends that the patent describes "jointly encoding" at least two values in the control information, the transport format and redundancy version, in subsets of values reserved for the transport format (the "TF range") and redundancy version (the "RV range"), respectively. (Dkt. No. 94 at 21 (citing '284 Patent 15:29-41, 16:60-17:24, Table 3).) PanOptis contends that the patent does not disclose that these subsets are "set aside just for" transport format or redundancy version; rather, it teaches and claims the opposite, explicitly giving examples where a redundancy version is implicit in the values of the "TF range" or a transport format is implicit in values of the "RV range." (*Id*. (citing '284 Patent 15:29-60, claims 3, 29).) PanOptis contends that Huawei's construction would exclude these disclosed and claimed embodiments.

Huawei contends that their construction is consistent with the way the patent uses the word "reserved." For example, Huawei contends that the patent explains that prior art techniques had

"2^5 [32] -1 = 31 transport format values," with "one value *reserved for* 'Out of Range'," and a 7 bit example where "3 values are to be *reserved for* signaling." (Dkt. No. 101 at 21 (quoting '284 Patent 27:10-11, 27:10-15).) Huawei further contends that their construction is consistent with extrinsic evidence dictionaries. (*Id*. at 22, n.9.) Huawei also points to this Court's construction of "reserved" in other cases. (*Id*. (citing *Customedia Techs., LLC v. DISH Networks Corp.*, 2017 WL 568669, 9 (E.D. Tex. Feb. 13, 2017) (construing "individually controlled and *reserved* advertising data storage section" to mean "individually controlled data storage section *set aside just for* storing the specifically identified advertising data"); *Freedom Wireless, Inc. v. Alltel Corp.*, 2008 WL 4647270, 11 (E.D. Tex. Oct. 17, 2008) (construing "*reserved* pre-paid cellular telephone number" to mean "a telephone number '*dedicated for* assignment to a pre-paid subscriber'")).)

Huawei contends that its construction also properly recognizes that the asserted claims do not cover every disclosed embodiment and that the "reserved for" feature, which is only described once in the patent (in the summary), is not illustrated in the joint field Tables (i.e., Tables 3-8). (Dkt. No. 101 at 22 (referencing '284 Patent 7:36-46).) Huawei contends that claims need not cover every embodiment. Huawei contends that the summary of the invention has three dozen embodiments, but not each one is described in detail and none of those detailed embodiments represent all other embodiments. (*Id*.) Huawei contends that none of the joint field embodiments in the detailed descriptions demonstrate the "reserved for" feature. (Dkt. No. 101 at 23 (citing '284 Patent 13:18-28:42 and Dkt. No. 101-1 (Bims Decl.) at ¶139).) Huawei contends that contrary to PanOptis' expert, Dkt. 94-2 ¶¶163-64, Tables 3 and 4 do not show the "reserved for" feature for both subsets of values:

TABLE 3

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	0	
0101	5	100	0	
0110	6	120	0	
0111	7	150	0	
1000	8	200	0	
1001	9	—	0	
1010	10	—	0	
1011	11	—	0	
1100	12	—	0	
1101	13	N/A	1	RV range
1110	14		2	
1111	15		3	

TABLE 4

Signaled Value (binary)	Signaled Value (decimal)	TF (TBS)	RV	Ranges
0000	0	—	0	TF range
0001	1	—	0	
0010	2	—	0	
0011	3	—	0	
0100	4	—	1	
0101	5	100	1	
0110	6	120	1	
0111	7	150	1	
1000	8	200	2	
1001	9	—	2	
1010	10	—	2	
1011	11	—	2	
1100	12	—	2	
1101	13	N/A	0	RV range
1110	14		1	
1111	15		2	

Huawei contends that in Tables 3 & 4, each Signaled Value in the defined TF range (rows 0-12) explicitly indicates an RV value (red boxes on the right sides); so no Signaled Value in the TF range (rows 0-12) is reserved for TF values. (*Id*. at 23 (citing Dkt. No. 100-1 (Bims Decl.) at ¶¶162-63).) Huawei contends that conversely, the RV range (rows 13-15) *is* set aside just for (i.e., reserved for) RV values: those rows only explicitly indicate RV values 1, 2, or 3; but the TF values in this range are "N/A" (green boxes on the left sides) because one cannot explicitly signal a TF value in these RV ranges. Huawei states that in Tables 3 & 4, only the RV ranges are reserved for RV; the TF ranges are not reserved for TF (the TF range can explicitly convey both RV and TF but does not exclusively indicate TF values; it always explicitly indicates an RV value). (*Id*.) Huawei contends that the same is true for the other joint field embodiments in the detailed description (Tables 5-8): they only show one subset reserved for particular values (the RV values in the RV ranges), but none of them show both subsets reserved for respective values. (*Id*. (citing Dkt. No. 100-1 (Bims Decl.) at ¶¶162-63).)

Huawei contends that PanOptis' construction reads the word "reserved" out of the claim language. Huawei contends that PanOptis' proposed construction renders "reserved for" meaningless because "using" one subset of values for TF values is different, and broader than,

“*reserving*” it for TF values. Huawei contends that “allocated,” which was rejected by this Court in *Customedia Techs*, is even narrower than PanOptis’ “used for.” (Dkt. No. 101 at 23-24.) Huawei contends that PanOptis would have *every* embodiment be a “reserved for” embodiment because every embodiment “uses” a subset for a TF range and another subset for an RV range. Huawei contends that not every one of the three dozen embodiments is claimed. Huawei contends that the “reserved for” feature is just part of one *alternative* embodiment; it is not a feature of every embodiment. (Dkt. No. 101 at 24 (citing ’284 Patent 7:36-46 (“According to *another* exemplary embodiment ….”)).)

In reply, PanOptis contends that in *Customedia Techs*, the patentee made distinguishing arguments that items were “reserved specifically for,” reserved for one type of data “as opposed to” another, and/or “set aside” during prosecution *Customedia Techs., LLC v. DISH Networks Corp.*, 2017 WL 568669, at *8 (E.D. Tex. Feb. 13, 2017). (“On balance, the [] consistent statements during prosecution should be given effect.”). PanOptis contends that, here “set aside just for” never appears in the intrinsic record. (Dkt. No. 102 at 8, n. 6.)

PanOptis contends that the specification describes embodiments of the invention generally in the summary of the invention, and then provides more detail on individual embodiments later in the detailed description. (Dkt. No. 102 at 8.) PanOptis contends that Huawei relies on six lines of the summary but that the patent describes utilizing the “jointly encoded” approach (as opposed to utilizing shared signaling). (*Id*. (citing ’284 Patent 7:36-46, 7:15-35.) PanOptis contends that across sixteen columns in the detailed description, the patent provides the details of its numerous embodiments, all of which are “jointly encoded” but none of which mention that values are “set aside just for.” PanOptis contends that each embodiment demonstrates that the two subsets of values are “reserved” or “used,” respectively, for transport formats or redundancy versions (and

may implicitly signal other information). (Dkt. No. 102 at 9 (citing '284 Patent 15:21-63, 16:60-21:3; Dkt. No. 94-2 (Haimovich Decl.) at ¶¶161-164).)

Analysis

Independent claims 1 and 14 are explicitly focused on the joint encoding embodiments:

> wherein the control channel signal received within said sub-frame comprises a control information field, in which the transport format and the redundancy version of the protocol data unit are ***jointly encoded***,..

'285 Patent claim 1 (28:57-60), claim 14 (30:9-12). In context of the explicit claim language itself, and the specification as a whole, this is clear. Huawei argues that the embodiment of the Summary of Invention is a different stand-alone embodiment than the joint encoding embodiments of Tables 3-8 and the rest of the specification. However, the passage cited to by Huawei does not make mention of joint encoding. As the claims are clear, even if such embodiment was a separate embodiment, its relevance to the joint encoding claims is limited at best. Moreover, the claims and specification must be read as whole. In context of the totality of the intrinsic evidence, it is clear that "reserved for" does not have to be reserved for exclusive use. Repeatedly, the embodiments for joint encoding show that the usage is not "set aside" for ***exclusive use***, as even Huawei admits. In context of the joint encoding embodiments of the specification, it is clear that some subset of values is reserved for the transport format and some subset of values is reserved for the redundancy version. That the values are reserved, however, does not mean that the values are reserved "***exclusively for***" so that nothing else can be found there, nor does it mean that there cannot be overlap of the subsets, as shown in the joint encoding embodiments. *See* '284 Patent 16:60-21:3.

The claims in question are directed toward a joint encoding embodiment, and Huawei would exclude all of the joint encoding embodiments. Therefore, the Court concludes that reading the claim to exclude the disclosed joint encoding embodiments would be incorrect. *See Accent*

Packaging, Inc. v. Leggett & Platt, Inc., 707 F.3d 1318, 1326 (Fed. Cir. 2013) (holding that a construction that excludes the preferred embodiment "is rarely, if ever, correct.") Though Huawei cites to other results in other cases dealing with other intrinsic records, the intrinsic record here dictates otherwise. "[C]laims 'must be read in view of the specification, of which they are a part.'" *Phillips*, 415 F.3d at 1314-15. (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

Having resolved the dispute between the parties, finding that "reserved" is not limited to "set aside," the Court finds that the plain meaning of the term needs no further construction. *See O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) ("district courts are not (and should not be) required to construe every limitation present in a patent's asserted claims."); *Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1207 (Fed. Cir. 2010) ("Unlike *O2 Micro*, where the court failed to resolve the parties' quarrel, the district court rejected Defendants' construction.").

The Court construes the term "wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of values, is reserved for indicating the redundancy version for transmitting the user data" to have its plain and ordinary meaning.

11. "processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data" ['284 Patent claim 1]

PanOptis:	Huawei:
No construction necessary. This claim term should not be governed by 35 U.S.C. § 112(6). But, should the Court determine that this claim term should be governed by 35 U.S.C. § 112(6), then PanOptis identifies that one or more of the following structure(s), act(s), or materials correspond to this claim term: **<u>Structure</u>**: Figs. 5-10, cols. 10:21-11:5, 11:52-12:26, 23:32- 25:17, 27:56-28:17, and/or equivalents thereof. **<u>Function</u>**: "determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data"	This term is written as a means-plus-function subject to 35 U.S.C. § 112, ¶ 6. **<u>Structure</u>**: The specification does not disclose the necessary structure, algorithm, or flowchart, which renders the term indefinite under 35 U.S.C. § 112, ¶ 1. **<u>Function(s)</u>**: "determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data"

The parties dispute whether the term is a means-plus-function term. If a means-plus-function term, Huawei contends that no algorithm is disclosed for the "processing unit."

<u>Positions of the Parties</u>

PanOptis contends that the term does not include "means for" language, and is therefore entitled to a presumption that it is not subject to § 112 ¶6. PanOptis contends that a "processing unit" is a well-understood term in the networking and communications arts. (Dkt. No. 94 at 22 (citing *Syncpoint Imaging, LLC v. Nintendo of Am. Inc.*, No. 2:15-cv-00247-JRG-RSP, 2016 WL 55118, at *20 (E.D. Tex. Jan. 5, 2016) (finding the term "processor" not subject to 112(6) where the claim "itself recites the objectives and operations of the processor") and Dkt. No. 94-2 (Haimovich Decl.) at ¶¶167-70).) PanOptis further states that the "processing unit" is not a nonce

term; rather, it connotes a well-understood structure: the processing unit of a mobile terminal, not generically meaning anything that manipulates data. (Dkt. No. 94 at 22.)

PanOptis contends that the claim itself describes the processing unit determining a transport format and redundancy version "based on the received control channel signal," from the "receiver unit" using the control channel information field that consists of two distinct subsets of values—of which one is reserved for indicating the transport format and the other for indicating the redundancy version. PanOptis further notes that the information is subsequently utilized by a "transmitter unit" to transmit a protocol data unit using the transport format and redundancy version. (Dkt. No. 94 at 22-23 (citing claim 1).) PanOptis contends this is analogous to *Realtime Data, LLC v. Rackspace US, Inc.*, No. 6:16-cv-961, 2017 WL 2590195, at *16 (E.D. Tex. June 14, 2017) (holding "processor" not subject to § 112 ¶6, noting § 112 ¶6 is not applicable where the objectives and operations are sufficiently described) and *E2E Processing, v. Cabela's Inc.*,2015 U.S. Dist. LEXIS 86060 (E.D. Tex. July 2, 2015) 2015 U.S. Dist. LEXIS 86060 at *20 (noting that § 112 ¶6 does not apply when there is context as to the "inputs and outputs" and where the components "interact[] with other components… in a way that… inform[s] the structural character of the limitation-in-question or otherwise impart[s] structure.").

PanOptis contends that if the term is a means-plus-function term, the specification sets forth sufficient structure for performing the claimed function. PanOptis contends that the claim and specification describe the processing unit determining a transport format and redundancy version based on the received control channel signal using the control channel information field. PanOptis contends that Claim 1 and the specification further illustrate this determining by explaining that the control channel information field consists of a number of bits representing a

range of values, including two distinct subsets corresponding to the transport format and the redundancy version. (Dkt. No. 94 at 23 (citing ’284 Patent 11:53-12:11, 15:29-41, 23:47-24:14).)

Huawei contends that “unit” is a nonce word that imparts no structure under a *Williamson* analysis. Huawei notes that this Court has found “unit” to be a nonce word. *Cellular Commc’ns Equip. LLC v. HTC Corp.*, 2015 WL 10741012, 13 (E.D. Tex. Mar. 9, 2015) (“determination unit” term subject to §112(6) because the term “only recites the function of designating without any corresponding structure”); *St. Lawrence Commc’ns LLC v. ZTE Corp.*, 2016 WL 6275390, at 19 (E.D. Tex. Oct. 25, 2016) (“spectral shaping unit” subject to §112(6) because “unit” is a nonce word, the term was “otherwise arranged in means-plus-function format[,]” and the modifier “spectral shaping” did not “impart sufficient structural meaning”). Huawei contends that beyond the nonce words, the term just recites the function performed. (Dkt. No. 101 at 25-26.)

Huawei contends that the term is indefinite because the specification does not disclose an algorithm for performing the “determining” function. Huawei contends that the specification merely parrots the claimed functional language without more. (Dkt. No. 101 at 26.) Huawei contends that PanOptis’ identified passages for structure do not cite any algorithms: claim 1 (merely recites the functions), 11:53-12:11 (functional descriptions and not clearly linked to the claimed “determining” function), 15:29-41 (same), 23:47-24:14 (same). (Dkt. No. 101 at 26.) Huawei further distinguishes *Syncpoint Imaging* and *Realtime Data* as being cases about a “processor” not a “processing *unit*.”

In reply, PanOptis contends that Huawei ignores the “wherein” clause limitation that further defines the processing unit: “wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field.” PanOptis further contends

that the claim language describes how the processing unit interacts with the receiving and transmitting units. (Dkt. No. 102 at 9.) PanOptis points to claim 1 and the passages at 11:53-12:11 and 15:29-41 as describing (1) that control information is transmitted to the receiving unit, (2) how the information determined by the processing unit is jointly encoded in the control channel field in N bits, (3) how the processing unit is configured for the determination of that field, including specific information about subsets of values, and (4) how the information the processing unit determines is then utilized by the transmitter unit to transmit a protocol data unit. (Dkt. No. 102 at 9, n.9.)

PanOptis further contends that Huawei argued to this Court earlier this year that "processing unit" in a mobile system has sufficient structure and is well-known in the art to be structure. (Dkt. No. 102 at 10 (citing Dkt. Nos. 102-2, 102-3, and 102-4 (briefing and expert reports in *Huawei Techs. Co. Ltd. v. T-Mobile US, Inc.*, No. 2:16-cv-56 (E.D. Tex.))).) PanOptis contends that when the claim and the specification describe the inputs and outputs of the processing unit, the processing unit's interaction with other units in the terminal, and the "determining" it performs, the term is not subject to §112(6). *See Huawei Techs. Co. v. T-Mobile US, Inc.*, 2017 WL 2267304, at *16 (E.D. Tex.) ("processing unit" is not subject to §112(6)).

<u>Analysis</u>

The term in question is "processing unit." The term "processor" may connote structure such as a central processor or a microprocessor. However, here the term is "processing unit," a term which may mean more. In fact, the specification makes clear that in the disclosure of the '284 Patent, embodiments of the invention are intended to encompass more than merely processors:

> Moreover, the invention according to other exemplary embodiments relates to the implementation of the methods described herein in software and hardware. Accordingly, another embodiment of the invention provides a computer readable medium storing instructions that, when executed by a processor unit of a base

> station, cause the base station to generate a control channel signal comprising a control information field in which a transport format and a redundancy version of the protocol data unit is jointly encoded, and to transmit the control channel signal to at least one mobile terminal.

’284 Patent 12:12-22. Similarly,

> Another embodiment of the invention relates to the implementation of the above described various embodiments using hardware and software. It is recognized that the various embodiments of the invention may be implemented or performed using computing devices (processors). A computing device or processor may for example be general purpose processors, digital signal processors (DSP), application specific integrated circuits (ASIC), field programmable gate arrays (FPGA) or other programmable logic devices, etc. The various embodiments of the invention may also be performed or embodied by a combination of these devices.

Id. at 27:60-28:4. Moreover,

> Further, the various embodiments of the invention may also be implemented by means of software modules, which are executed by a processor or directly in hardware. Also a combination of software modules and a hardware implementation may be possible. The software modules may be stored on any kind of computer readable storage media, for example RAM, EPROM, EEPROM, flash memory, registers, hard disks, CD-ROM, DVD, etc.

Id. at 28:5-28:12. It is clear that in context of the particular specification of the ’284 Patent, “processing unit” is broadly interpreted, including a wide range of hardware (including, but not limited to, processors), hardware and software, or software modules executed by a processor or directly in hardware. PanOptis contends that this case is similar to *Huawei Techs. Co. Ltd. v. T-Mobile US, Inc.*, No. 2:16-cv-56 (E.D. Tex.) in which this Court found “processing unit” to not be a means-plus-function term. The intrinsic record here is different, however, as noted in the specification passages above.

Further, though PanOptis argues that the claims provide definite inputs, outputs and structural connections for the processor unit, the Court finds the opposite. The claim here is distinguishable from that in *Huawei Techs. Co. Ltd. v. T-Mobile US, Inc.* Here, the claim calls out

a mobile terminal having a receiver unit, processing unit and transmitting unit. Though the claim may include numerous limitations as to the various signals, transport format, redundancy version, control information field, etc., the claim provides very little detail beyond the functional language as to the processing unit. The inputs to the processing unit are not explicitly recited, the outputs of the processing unit are not explicitly recited, and where signals are provided to and from the processor are not recited. As to the processor unit specifically, the claim merely states:

> a processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data

('284 Patent claim 1) and "wherein the processing unit is further configured for the determination of the control information field." (*Id*.). It is noted that as drafted, the processor unit does not even have to receive the control channel signal as an input, but rather merely has to make a determination "based" on the control channel signal received by the receiver. The words of the claim itself provide no bounds or meaning to the "processing unit" beyond the functional limitations noted above. In this regard, the intrinsic record, including the specification and the claims, is distinguishable from *Huawei Techs. Co. Ltd. v. T-Mobile US, Inc.*

Though a presumption that the term is not a means-plus-function term exists, because "means" is not recited, *Williamson* makes clear the use of a nonce word that does not provide sufficiently definite means as the name of structure can invoke means-plus-function claiming. *Williamson*, 792 F.3d at 1349. Specifically, *Williamson* states the standard to be:

> The standard is whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure. *Greenberg,* 91 F.3d at 1583. When a claim term lacks the word "means," the presumption can be overcome and § 112, para. 6 will apply if the challenger demonstrates that the claim term fails to "recite sufficiently definite structure" or else recites "function without reciting sufficient structure for performing that function." *Watts,* 232 F.3d at 880. The converse presumption remains unaffected:

> "use of the word `means' creates a presumption that § 112, ¶ 6 applies." *Personalized Media,* 161 F.3d at 703.

Id. Williamson further stated that:

> Generic terms such as "mechanism," "element," "device," and other nonce words that reflect nothing more than verbal constructs may be used in a claim in a manner that is tantamount to using the word "means" because they "typically do not connote sufficiently definite structure" and therefore may invoke § 112, para. 6.

Id. at 1350. As used in the broad generalized descriptions of the '284 Patent, "unit" is a nonce word and the "processing" modifier provides no structural bounds. Further, as to the surrounding claim language, the statements in *Williamson* are applicable here:

> While portions of the claim do describe certain inputs and outputs at a very high level (e.g., communications between the presenter and audience member computer systems), the claim does not describe how the "distributed learning control module" interacts with other components in the distributed learning control server in a way that might inform the structural character of the limitation-in-question or otherwise impart structure to the "distributed learning control module" as recited in the claim.

Id. at 1351.

Though Huawei contends no algorithms are disclosed, the Court finds otherwise.[5] Specifically, Figure 5 provides exemplary channel signals that have a joint transport format and redundancy version (TF/RV) field. '284 Patent Figure 5, 12:55-58, 22:45-59. Tables 3-8 illustrate signaled values identifying joint transport format and redundancy version. In context of the specification, the processing unit detects these signaled values in the TF/RV field. The patent describes the control information field has this data jointly encoded, and the transport format and redundancy version are determined from the control information field. *Id* 10:21-34. Thus, as shown in the Figures and Tables, an algorithm for detecting transport format and redundancy version is

[5] At the oral hearing, PanOptis maintained its assertion that the term was not a means-plus-function term. However, if the term is found to be a means-plus-function term, PanOptis agreed to the Court's construction adopted herein. (Dkt. No. 111 at 102.) The issue as to whether an algorithm is required, is, thus, not before this Court as the parties agree to the inclusion of an algorithm

provided in which data in a joint field of a transmission is detected to obtain a signaled value that correlates to a transport format and redundancy version.

The Court construes "processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data" to mean:

Function: "determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data"

Structure: hardware programmed, or hardware with software programmed, according to an algorithm in which a determination of the transport format and the redundancy version is made such as described at 10:21-34 by determining the data within a joint field of a transmission such as shown and described in Figure 5, 12:55-58, 22:45-59 and that data is correlated to the transport format and redundancy version via tables such as Tables 3-8, and equivalents thereof.

12. "in response to" ['293 Patent claims 1, 12, 20]

PanOptis:	Huawei:
No construction necessary.	"in response to . . . and not in response to the occurrence of any intermediate condition, event, or determination"

The parties dispute whether "in response to" requires an event to occur with no intermediate conditions, events or determinations.

Positions of the Parties

PanOptis contends that the intrinsic record does not require the negative limitation of an absence of "any intermediate condition, event, or determination" in any claim element. PanOptis

also contends that the open-ended "comprising" language, which allows for additional elements beyond the claimed elements occurring "in response to" a condition, including the existence of intermediate conditions, events, or determinations. PanOptis also contends that Huawei's construction reads out multiple preferred embodiments in the specification that suggest or allow intermediate conditions, events, or determinations when using the phrase "in response to," including embodiments reading on each of the three identified elements of the above claims. (Dkt. No. 94 at 30 (citing Dkt. No. 94-2 (Haimovich Decl.) at ¶¶227-33).)

PanOptis acknowledges that the plain meaning of "in response to" indicates a causal relationship. However, PanOptis objects to Huawei's construction as improperly prohibiting intermediate conditions, determinations, or events, such as links in a causal chain. (Dkt. No. 102 at 10.) PanOptis contends that Huawei fails to identify any intrinsic evidence that requires the exclusion of links in a causal chain. PanOptis contends that the claims and specification allow for the possibility of such links. (*Id*. (citing Dkt. No. 94-2 (Haimovich Decl.) at ¶¶222-33).)

Huawei contends that "in response to" defines a logical relationship where (i) the occurrence of the cause controls whether or not (ii) the effect is performed. Huawei states that if the "occurrence of any intermediate condition, event, or determination" controls whether or not the effect is performed, the effect is no longer "in response to" the cause.

Huawei contends its construction is consistent with the structure of the claims and disclosure in the specification. Huawei states that the claim limitations that recite "in response to" include a ***cause***, (e.g. "first data becoming available for transmission") and an ***effect*** (e.g. "transmitting a first scheduling request"). Huawei contends that the claims unequivocally require a cause and effect relationship without the interference of any "intermediate condition." (Dkt. No. 101 at 27.) For example, Huawei points to claim 1, limitation [c], which recites "in response to

receiving the SG, transmitting from the mobile terminal to the base station transmit buffer status information." Huawei contends that the plain language of the claim requires that if a mobile terminal "receiv[es] . . . the [scheduling grant]" it must "transmit[] . . . buffer status information" in order to meet the limitation. Huawei contends that the specification confirms a cause and effect relationship that lacks intermediate conditions that control the outcome: "the UE transmitting a first scheduling request (SR) to the base station in response to data becoming available for transmission to the base station" ('293 Patent 3:3-6); "[i]n response to receiving the SG, the UE transmits to the base station transmit buffer status information" ('293 Patent 3:8-9); "the UE transmits a second SR to the base station at a next opportunity in response to determining that the triggering event has occurred" ('293 3:15-18). (Dkt. No. 101 at 27-28.)

Huawei contends that the Federal Circuit and District Courts have repeatedly interpreted the phrase "in response to" in a manner consistent with Huawei's proposal. (*Id*. at 28 (citing *Am. Calcar, Inc. v. Am. Honda Motor Co., Inc.*, 651 F.3d 1318, 1340 (Fed. Cir. 2011) ("'[i]n response to' connotes that the second event occur in reaction to the first event.")).) Huawei states that *American Calcar* underscores that "in response to" requires a cause and effect relationship. Huawei contends that in *American Calcar*, the District Court rejected a patentee's contention that the term should merely mean "after:"

> "[I]n response to[]" means something more than simply "after"…the phrase "in response to" connotes more of a cause-and-effect type of relationship rather than a straight temporal sequence.

Am. Calcar, 2007 WL 5734827, 6 (S.D. Cal. Sept. 24, 2007). Huawei contends that the Court construed the term "according to its plain and ordinary meaning, i.e., provision of the option on the display element occurs in response to the notable condition, not in response to any action on the part of the user" and the Federal Circuit agreed. (Dkt. No. 101 at 28 (citing *Am. Calcar*, 2007

WL 5734827 at 6*; Am. Calcar, Inc.*, 651 F.3d at 1324-25, 1329, 1339-40).) Huawei contends that PanOptis' infringement contentions make clear that PanOptis is interpreting the term on multiple independent conditions, events and determinations that control whether or not the recited effect occurs. (*Id*. at 29, n. 12.)

Huawei contends that the alternative embodiments pointed to by PanOptis: (1) contradict other portions of the specification, (2) do not use the term "in response to," (3) describe an embodiment subject to a restriction requirement during prosecution, and/or (4) are explicitly claimed by another patent related to the '293 patent. As an example, Huawei points to PanOptis' expert's statement that an alternative embodiment which states "[i]n response to the SG, UEl may transmit a buffer report that indicates the high priority of the data in UEl's transmit buffer" means the performance of step (c) of claim 1, (b) of claim 12 and (c) of claim 20 is optional, even if the "cause" (i.e. receiving a scheduling grant) occurs. (*Id*. at 29 (citing Dkt. No. 94-2 at ¶231 and '293 Patent 7:29-31).) Huawei states that the quoted portion relied upon by PanOptis' expert is describing Figure 5 of the '293 patent, which describes claims that were cancelled by the applicant pursuant to a restriction requirement during prosecution. (*Id*. (citing Dkt. No. 101-1 (Bims Decl.) at ¶¶232-33).) Huawei contends that PanOptis has not explained why this single inclusion of the word "may" means that the claim limitation does not have a cause and effect relationship when the claim does not use the word "may" and other portions of the specification do not use optional language for this interaction. (*Id*. at 29-30 (citing '293 Patent 3:8-9).)

Huawei also addresses PanOptis' argument that an alternative embodiment where "a triggered but not yet transmitted SR should be cancelled whenever the UE obtains a scheduling grant" contradicts Huawei's construction. (Dkt. No. 101 at 30 (citing Dkt. No. 94-2 (Haimovich Decl.) at ¶¶227-29; '293 Patent 7:15-21).) Huawei contends that this passage does not use the

phrase "in response to" and also plainly does not support the corresponding limitations of claims 1, 12, and 20 because the passage contemplates a situation where a scheduling request is not transmitted "in response to" a "scheduling request triggering event," contrary to the requirements of the asserted claims. (*Id*. (citing claim 1 (d2) ("in response to determining that the triggering event has occurred, at a next opportunity, transmitting a second SR to the base station")).)

Analysis

The term is found in various portions of the claims. Claim 1 is illustrative of the term's usage in the claims. A mobile terminal may transmit a scheduling request to a base station "***in response to***" data becoming available to transmit from the mobile terminal. Then, after a mobile terminal sends a scheduling request to a base station, the mobile terminal receives a scheduling grant from the base station. Then "***in response to*** receiving the SG, transmitting from the mobile terminal to the base station transmit buffer status information." Finally, the claim states "***in response to*** determining that the triggering event has occurred, at a next opportunity, transmitting a second SR to the base station." '293 Patent claim 1 (emphasis added). Sending the scheduling request, receiving the scheduling grant and transmission of buffer status is initially described in the Background portion of the specification. *Id*. at 1:58-2:61, Figures 2 and 3.

This is not a situation such as in *Am. Calcar* where the parties debated whether merely having one event occur after another satisfies "in response to." Here, PanOptis agrees that a causal relationship is needed between the reception of the SG and transmission of the buffer status information. (Dkt. No. 102 at 10.) *Am. Calcar* stands for the proposition that "'[i]n response to' connotes that the second event occur in reaction to the first event." *Am. Calcar*, 651 F.3d at 1340. There is no dispute between the parties as to such meaning. However, Huawei would distort that meaning to mean the second event occurs in reaction to the first event and no other event may

intervene, or have any impact whatsoever on, the occurrence of the second event.[6] *Am. Calcar* stands for the proposition that a causal relationship exits, but does not support the construction proposed by Huawei.

At the oral hearing, Huawei emphasized the flowchart of Figure 6a as indicating that a simple yes/no decision is made in box 616 and direct feedback is provided to box 604 to transmit a scheduling request, indicative that "in response" requires no intermediate conditions, events or determinations. (Dkt. No. 111 at 103.) At most, Huawei relies on the illustrative embodiment of one of the claimed "in response to" usages. Huawei has not pointed to any evidence in the intrinsic record indicative that the plain and ordinary causal relationship ("in reaction to") was disclaimed or disavowed to warrant inclusion of the negative limitations Huawei seeks. Mere citation to one embodiment in the specification does not support the negative limitations. *Arlington Indus.*, 632 F.3d at 1254. Further, even the description of that embodiment does not describe that all intermediate conditions, events or determinations are banned. For these reasons alone, Huawei's arguments fail.

The parties debate the relevance of the various embodiments to the particular claims at issue. However, as noted above, "in response to" is generally utilized in connection to multiple steps of the claims. The overall context of the specification provides meaning to "in response" as the term is utilized throughout the various embodiments and within various steps of each embodiment. Even accepting Huawei's arguments as to differing embodiments, these

[6] At the oral hearing, the narrowness of Huawei's interpretation was fully brought out when the Court asked Huawei if a first phone would ring "in response" to a second phone dialing the first phone's number. Huawei did not deny that intervening events, conditions and determinations such as the phone lines being connected, the phone company switch working, the first phone being powered, etc. would exclude (under Huawei's construction) the first phone from ringing "in response" to the second phone dialing the number of the first phone. (Dkt. No. 111 at 108-109.) There can be no doubt, however, that in such situation a cause and effect relationship exits such that the first phone rings in reaction to the dialing by the second phone.

embodiments still provide overall context in view of the intrinsic record as a whole as to the meaning of "in response to." Further, as to the embodiment in which a triggered scheduling request may be cancelled, the Court finds such an embodiment provides relevance to the claims at issue. Huawei argues that the claims in question require the actual transmission of the triggered scheduling request, and thus cancellation is not relevant. However, Huawei's strict negative limitation itself indicates the relevance. Under Huawei's construction, checking for cancellation (even if not canceled) would be an "intermediate determination" barred by the claims. The context of the intrinsic record as a whole provides further reasons to reject Huawei's strict negative limitation. As such, Huawei's negative limitation strictly limiting the plain and ordinary causal relationship is not supported.

The various claim limitations require various events to be "in response to" other events. Such language requires some causal relationship such that an event occurs in reaction to another. The parties have not presented evidence that this does not conform to the plain and ordinary meaning. In addition, Huawei has not shown support in the intrinsic evidence to narrow this meaning to "not in response to the occurrence of any intermediate condition, event or determination." Having rejected Huawei's narrowing construction, the Court finds that the claim construction dispute has been resolved and no further construction is needed. *See Finjan, Inc.*, 626 F.3d at 1207 (Fed. Cir. 2010) ("Unlike *O2 Micro*, where the court failed to resolve the parties' quarrel, the district court rejected Defendants' construction.").

The Court finds that the term "in response to" has its plain and ordinary meaning.

CONCLUSION

The Court adopts the constructions above for the disputed and agreed terms. The parties

should ensure that all testimony that relates to the terms addressed in this Order is constrained by the Court's reasoning. However, in the presence of the jury the parties should not expressly or implicitly refer to each other's claim construction positions and should not expressly refer to any portion of this Order that is not an actual construction adopted by the Court. The references to the claim construction process should be limited to informing the jury of the constructions adopted by the Court.

SIGNED this 18th day of January, 2018.

ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE